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I.

A UNIQUE CASE OF CONGENITAL LUXATION OF THE ANKLE.

ALBERT H. FREIBERG, M.D., CINCINNATI, OHIO.

In all of the reported cases which I have been able to find, congenital luxation of the ankle has been associated with defect of the fibula. These cases have been divided by Hoffa into two classes. In the one the defect of the fibula has been associated with angular deformity of the tibia and defective development of the foot; in the other the foot has been of normal shape, but the outward deviation of the foot upon the leg has been ascribable to the imperfect development of the external malleolus, depriving the astragalar mortise of its outer part, and to the obliquity of the articular surface of the tibia. The case which is herewith reported belongs in the second class for the reason that the obliquity of the joint line and normal condition of foot and toes are evident. It would appear to be of especial interest, however, because the fibula is present throughout its course, being possibly thicker than normal, and because it seems possible to draw rather definite conclusions from it regarding the etiology of this whole group of cases.

The patient, a girl of twenty-four months, is the daughter of a baker, and was brought by her father to the dispensary of the Medical College of Ohio. The deformity of the left ankle had been noticed from birth; and its correction had been attempted by desultory courses of manipulation and massage,

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but without effect. From the first, attempts at walking were attended with great difficulty, but the child has learned to walk with a peculiar limp. Upon walking a short distance, the child complains of fatigue and finally of pain. There have been no congenital malformations in other members of the family (four other children). The pregnancy and labor of the mother were

FIG. 1. Congenital dislocation of the ankle.
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absolutely uncomplicated. The father acknowledged having had a venereal sore many years ago, for which he was treated and which has been followed by no symptoms of constitutional lues. His other children, according to his statement, have shown no signs of this disease. The mother never miscarried, and all of her children are living.

The child has always been in good health. There have been

none of the symptoms of rickets. There is no rosary, and the epiphyses of the other long bones are of normal size. The head is of normal shape. The gait is a peculiar limp, showing great weakness in the left limb; and the pelvis is seen to descend with the application of the left foot. The whole plantar surface is brought into contact with the ground. The photograph shows the outward displacement of the foot upon the leg when weight is borne, but not nearly to the true extent. The child had to be held by the father for the picture, but kept the knees somewhat flexed. The feet are both very flat, but are not everted in walking or standing. Even in recumbency the left foot had its axis in a plane decidedly lateral to that of the leg. The internal malleolus appears prominently, and the external also can be seen. They are both felt to be enlarged, but especially the external, which lies in a plane decidedly above that of the other. Passive motion of the ankle shows the joint line to be oblique from without inwards and downwards. Almost the full normal range of motion is present. The internal contour of the limb is quite straight: the external presents a marked indentation above the ankle. There was no sore or dimple of the skin at this place. The fibula can be felt throughout its length. The feet are of equal size, and present no abnormality of development. The legs are of equal length. The child is otherwise perfectly developed and healthy.

The child was so unruly that the radiograph was made with difficulty. It was, however, sufficiently successful to show the conditions satisfactorily. It is at once seen that the fibula is present in its entire length, but that its shaft is greatly curved inwards, diminishing greatly the width of the interosseous space. The bone appears thick in comparison with the tibia. The diameter of the latter on the radiograph is 12.0 mm. at the middle, while that of the fibula is 8.0 mm. at a corresponding point. It is in the ankle joint, however, that the most interesting condition is found. Instead of being distinctly lower than the inferior tibial epiphysis, that of the fibula is higher. The joint line is at an angle of 75° with the axis of the leg, slanting from without inwards and downwards. On the

FIG. 2. Congenital dislocation of the ankle.
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tracing made over the negative, therefore representing the limb in recumbency, the axis of the leg falls to the inner side of the astragalus altogether. It appears to me perfectly justifiable, on this account, to consider this a congenital dislocation of the ankle joint.

It was proposed to do osteotomy of the fibula in the hope of bringing down the external malleolus, with possibly the same operation upon the tibia in order to correct the obliquity of the joint line. All operative interference was, however, declined; and the child disappeared from view.

As far as I have been able to ascertain, the case is unique, and its practical interest is therefore not great. In endeavoring to account for its production, it appeared to me to stand in an interesting etiological relation to the cases of defective fibula. The most commonly accepted view of their causation is that of Sperling,* which assumes the pressure of a too narrow amnion early in the embryonal period. In the present instance it would appear that the curvature of the fibula must have been produced by some such pressure,—pressure great enough to simply bend the developing fibula, but not enough to interfere with its further development. Whether the joint line was oblique at birth it is impossible to say. This may have developed in consequence of the abnormal function of the joint during the second year of life. The same may be said of the thickness of the fibula. In weight-bearing the astragalus was under the lower fibular epiphysis, and it is therefore probable that the fibula transmitted considerable stress to the foot.

In all of its physical characters, it seems to me, this case would correspond to an incomplete form of the so-called "Volkmann's Congenital Ankle Deformity," in so far as the fibula has its bony structure intact.† It is furthermore almost self-evident to me that the curvature of the fibula against the straight tibia could have been brought about only by pressure upon it against the tibia. In this far, this case seems to corroborate the theory of amniotic pressure in the production of defective fibulæ and the deformities thereupon consequent.

* Sperling, *Zeitschr. f. Geburtsh. u. Gynäkol.*, 1892.

† Haudek, *Zeitschr. f. orth. Chir.*, Bd. LV. p. 338.

II.

A PRELIMINARY STUDY OF FUNNEL-FRONT.

T. C. BALDWIN, M.D., SALT LAKE CITY, UTAH.

That the deformity known as Funnel-breast is not so rare an affection as is usually supposed, I am very well satisfied.

This affection, which is now usually known as Funnel-breast of Ebstein, and which has since been called Funnel-chest by some one, whose name I do not now remember, has been recognized and described by a number of writers, particularly in England as well as in Germany, long before Ebstein wrote on the subject. His articles perhaps attracted more attention than any of the preceding articles; and he was the first, so far as I am able to learn, to give a particular name to the deformity. Others had written on the subject, describing the condition as a rare deformity of the breast-basket, and also under other names, all of which I think are more or less incorrect. It is hard to give the condition a name that will correctly describe it.

But "deformity of the breast-basket," or "funnel-breast," or "funnel-chest," which Professor O. L. Schmidt, of Chicago, in a letter to me on the subject says he thinks is more correct, all fail to more than partially describe the location of the deformity at the point where it is usually described as existing, although the range of location has been extended to take in much more than it seems was at first intended when the name "funnel-breast" was first given to the condition.

This, I think, is right; for funnel-breast, if this name be adopted for the deformity, or funnel-front,—which I shall propose as broader and allowing other portions of the anterior surface of the body to be included where a depression exists,—takes in more than the breast of the one affected.

The funnel-breast of Ebstein was supposed to describe a depression including the lower end of the sternum, or xiphoid

cartilage, and the upper portion of the anterior abdominal wall lying between the cartilages of the lower ribs; but in the descriptions of the cases which I have found described under this head there are some which include much more than what is embraced in the boundaries which I have mentioned. This being the case, the name "funnel-front," although hardly making the location definite enough, has seemed to me to be more nearly correct, because, besides including the anterior chest walls, or any portion of them that might show a depression of this character, it also includes the anterior abdominal wall, which forms a large part of the funnel as described under the term "funnel-breast."

It seems that Ebstein in 1882 first called general attention to this deformity; and Dr. Hermann Goesche in 1895, in an Inaugural Dissertation, gives a very exhaustive review of what he supposes to be all the cases—twenty-four in number—which have been published up to that time, to which he adds the history of six others, and to him I am indebted for the information in regard to these cases which would have been otherwise inaccessible. His cases, however, only cover those mentioned in the French and German literature, while a number of cases published in the English language are not mentioned. Such of these cases as I have been able to find I shall briefly mention; for the description corresponds to those described by Ebstein and other German writers, and the condition is attributed to the same causes which some of the German writers have mentioned.

Just here I may say that I doubt the correctness of the conclusions as the cause in most of the cases I have seen mentioned by different authors.

In order that we may study the different theories of cause of this deformity, I shall briefly mention a number of cases reported by the French and German writers, and for this purpose shall have to draw my information from Dr. Goesche's thesis, and then shall refer to those cases described by English authors and some in this country, as well as four cases of my own which I shall very briefly mention, leaving a more complete

description for some future time when I shall have photographs and, if possible, skiagraphs.

Nearly fifty years before Ebstein's paper Dr. John A. Ingels, of Paris, Ky., in a paper published in the *Transylvania Journal*, vol. vii., 1834, pp. 488–492, describes a case which, I think, might be truly called a *double* funnel-breast.

A negro child belonging to Dr. Robert Taliaferro showed at birth a slight deformity. This increased until at the age of eighteen months the child died, death seeming to take place from suffocation. A post-mortem was held which the doctor describes in the following words:—

> The peculiarity of the case consisted mainly in an apparent effort on the part of nature to separate the cavity of the chest into two apartments, an anterior and a posterior. This was measurably accomplished by a very extensive incurvation of the nine or ten *superior* ribs on each side, so that at the distance of about one-third of their length from the sternal ends (the point of greatest indentation) their internal surfaces were very considerably approximated. But the division was rendered much more complete by large cartilaginous tubercles of a semi-spherical form, one of which was based upon the point of the internal convexity of each curved rib.
>
> These tubercles were ranged in vertical rows, one on each side, and equi-distant from the sternum.
>
> They presented a singular and beautiful appearance; and, when discovered, the case assumed a new and more interesting character.
>
> The heart presented itself immediately to view when the sternum was elevated. It occupied the anterior chamber to the exclusion of the lungs. These, being thrown into the posterior, were not brought into view until the heart was partially removed and the approximated ribs forced wider apart.

In 1840, in an article published in the London *Lancet*, vol. ii. pp. 44–46, George A. Rees, M.R.C.S., mentions a case with depression on sides of sternum, as described in his article in the *Medical Gazette* of Jan. 12, 1839, and shown to the London Medical Society Feb. 12, 1839.

While mentioning faulty positions in holding the child and compression of the chest, he believes that the cause of the deformity is disease of the lungs, not allowing expansion. He

writes of the same subject in the *Lancet* in 1847, and again in 1850.

In 1857 Dr. Glover in London *Lancet*, vol. i. p. 263, mentions the case of a male eighteen years old, with great depression or absence of the ensiform cartilage. This depression was first noticed to begin when thirteen or fourteen years of age, gradually increasing.

He is an imbecile, but not altogether without intellect. He has no pain and no other abnormality except some lateral curvature. No cause is known.

In 1872 Dr. C. Theodore Williams in the Transactions of the Pathological Society of London, vol. xxiii. pp. 50–52, describes the case of a patient, age seventeen, as follows:—

> On examination I found the chest remarkably distorted, the lower half of the sternum and the adjoining cartilages being so depressed as to form a hole an inch and a quarter in depth, and large enough to contain the greater part of one's fist.
>
> The depression begins at the level of the third costo-sternal articulation, and ends with the ensiform cartilage.
>
> The chest is generally somewhat flattened and the shoulders thrown forward, and there is slight lateral curvature to the right.
>
> Antero-posterior measurement:—
>
> At level of mammæ . . . . . 6½ inches.
> At ensiform cartilage . . . . . 4½ "
>
> Mother, father, and one brother had same hole in their chests. No others affected. This case was born with the depression, but at two years had whooping-cough, and since that time the depression has increased, and his breathing is interfered with.

During the discussion of this case Dr. C. J. B. Williams mentioned the case of a captain in the navy with a depression of the sternum so deep that it held a pint of water as he lay on his back.

At advanced age he suffered from increasing embarrassment in breathing and circulation, and ultimately became dropsical from this cause.

In 1886 Mr. B. Blower in the Liverpool *Medico-Chirurgical Journal*, vol. vi. p. 470, describes the case of a male, age twenty-one, as follows:—

Approximation of anterior and posterior chest walls in the middle line.

The second piece of the sternum is bent at an angle about the centre, apex of angle pointing backwards, forming cup-shaped depression holding ten ounces when lying on his back. There is a lateral and an antero-posterior curvature forwards of the spine.

Antero-posterior dimensions about three inches. Antero-posterior and median mediastina must be almost, if not entirely, obliterated. I have no doubt that rickets was the original cause of this deformity.

In 1892 Professor Dr. M. Bernhardt, in *Deutsch. Arch. f. klin. Med.*, vol. xlix. p. 604, mentions a case of depression at xiphoid. In 1889 Professor O. L. Schmidt, in a paper read before the Chicago Medical Society and published in *Medicine* in May, 1895, p. 79, describes a case of funnel-breast in a man thirty years old. This man, up to the age of twenty-two, had never been sick, but now begins to suffer with marked general weakness and pains in the chest, particularly in the back. After about one year a cough shows itself. This condition continues for two years, gradually getting worse. During this time the attention is attracted to a gradual sinking in of the lower end of the breast-bone. After six years he has grown so much worse that he is entirely disabled. By this time the depression has reached a depth of $5\frac{1}{2}$ centimetres, is to the right of the mesial line, and is accompanied by considerable irregularity of each lateral half of the thorax. There is a well-marked scoliosis.

In both lungs there are inflammatory conditions of the bronchi, and in the lower posterior part of the right lung there is a large cavity.

The existence of a bronchiectasis with a large cavity is established.

Dr. Schmidt excludes this as a possible cause, and seems to incline to the belief that the deformity may be due to an osteomalacial weakening of the bony and cartilaginous frame of the chest; and, as the lower end of the sternum moves, he believes that the end of the bone is fixed by some possible adhesions or that the fasciculus of diaphragm attached to it produced this action. This may possibly have played an important part

in the formation of the depression after the sternum began to weaken.

These with the cases reviewed by Dr. Goesche and one or two others to which I do not now have access are all that I have been able to find on record; and the causes assigned for the condition, where any cause is mentioned, are almost as numerous as the cases.

I shall now briefly look at the causes mentioned by the authors and reviewed in Dr. Goesche's paper, and then after a very brief mention of my own cases will compare the causes assigned, and see if we can reasonably accept any of them.

Without attempting to review each case reported, I shall briefly mention those cases in which there were points of interest besides the funnel-breast.

Eggel in his case says it cannot with certainty be shown that there was rickets.

Fliesch reports a case at age of fourteen in which there was a high breast at first, and afterwards developed funnel-breast and scoliosis.

Zukerkandl reports a case which, besides funnel-breast, has a kyphosis.

Ebstein reports a case which in second year had inflammation of brain, since which a paralysis of both limbs exists, and both are atrophied and both have contraction of knee. The left limb is in position of equino-varus, and the right in that of valgus. The second and third toes of both feet have disappeared, and he has also a right-handed scoliosis.

Graeffner reports the case of a man eighteen years old whose mother states that during the last months of pregnancy she slipped and fell, striking the abdomen on a sharp-edged milestone with great force. Several days after delivery of the child she noticed in the cardiac region a striking deepening of the breast wall. With advancing growth the dimensions of this depression have constantly increased. The right side of the breast lags behind in respiration. The vertebral column runs spirally.

Muhlhauser reports a case in a male forty-two years old.

In third year had rickets. The breast-bone with the ribs and collar-bones look as if they were pressed in by force in the form of a funnel, so that the outer dimensions from the breast-bone to the spinous processes amounts to only three inches.

Kündmuller reports a case in a boy eleven years old. A small depression might have existed at birth. The vertebral column is scoliotic, and on both sides there is a genu valgum.

He also reports a case of a man nineteen years old with funnel-breast and dorsal scoliosis, whose father also has funnel-breast.

Vetlesen reports a case in a boy seven years old, who was born asphyxiated, on account of which the midwife used pressure for a considerable time over the chest wall.

Klemperer reports the case of two brothers, ages nineteen and twenty-three, whose mother, grandmother, and great-grandmother were all afflicted with this malformation.

These brothers possess peculiarly formed crania, with flat, short foreheads.

Grünenthal reports a case of a girl of seventeen years with depression that was noticed immediately after birth, and who also has scoliosis. The left arm and leg are weak and atrophied and shorter than the right. He also reports the case of a girl seventeen years old, a cousin of the last mentioned, who has three sisters with malformations, and one brother had funnel-breast. The right extremities are weak and atrophied, and have not developed as the left have. She has a kyphosis, and also a scoliosis with double club-feet.

He reports the case of a sister of the above who has funnel-breast and scoliosis with weak, hyperextended joints.

Dr. Goesche reports some other cases of funnel-breast with associated deformities. I shall now describe my own cases as briefly as possible.

Case 1.—An eighteen-year-old girl has a depression of the ensiform cartilage and surrounding tissues, and, so far as I can learn, it is congenital; but it was not noticed, I think, until I was examining her for a slight scoliosis which has developed in the last two or three years. A younger sister has a considerable lumbar scoliosis.

Case 2.—A boy nine years old has a marked depression of the ensiform cartilage, amounting to about 5 centimetres in depth. Six other children in the same family, also the father and mother, are healthy. Up to the age of four years this boy was well and strong. At this time he had rheumatism, and after this the depression began to show, and has increased until now it is quite large. The abdominal walls are flabby, allowing the abdomen to protrude markedly. His feet are in the condition of slight valgus.

Case 3.—A two-year-old child has a depression to the left of the sternum, just over the apex of the heart. This is about the size of a half-egg, split lengthwise. She also has a right-sided congenital dislocation of the hip.

Case 4.—A five-year-old boy has a similar depression to the last one described, but has no other malformation.

Whether these last two cases should be included as examples of funnel-front is a question; and still I think they may, as the location of this trouble is not always just the same.

Now as to the cause, I can only mention a number, and pass them hurriedly. Atmospheric pressure, which has been mentioned as one cause, I do not believe has any influence whatever in producing this deformity.

A fall on a mile-stone, as mentioned in one case, I think, is an impossible cause; for I do not believe a child is ever in a hyperextended position *in utero*, with the chest wall pressing against the anterior abdominal wall of the mother, to receive a blow of this kind. Neither do I believe that prolonged pressure to resuscitate an asphyxiated child would produce any such condition. Neither do I believe that a fall in an epileptic attack would produce it.

That intrauterine pressure may account for some congenital cases such as these last two I have mentioned, I think is possible, as I believe it may account for some such conditions as congenital scoliosis. This may be caused by lack of amniotic fluid and too limited motion of the limbs.

The mother of the last boy mentioned tells me she was very small during her pregnancy and had very little water.

That a local arthritis deformans might follow an attack of

rheumatism and produce a condition of this kind might be possible. But these are merely suggestions.

In acquired cases I believe the suggestion of Dr. Schmidt in regard to his case, that it might be due to an osteomalacia, is very likely correct. And that this same disease may manifest itself locally, and produce this deformity even in children, I believe is possible; for, while osteomalacia is a disease usually of adult life, we do have an infantile osteomalacia as well as the same disease *in utero*.

This or rickets, I believe, is the most plausible solution of the cause. Added to this, we may have a partial paralysis of the abdominal muscles, as we do of the leg muscles in cases of congenital club-foot and of the back muscles in scoliosis. It seems to me the strong contraction of that portion of the diaphragm attached to the lower end of the sternum, together with the triangularis sterni drawing the lower end of the sternum backwards with a relaxed condition of the recti, might encourage a depression of this kind, which, once begun, would naturally increase.

This might be a cause for either congenital or acquired funnel-front; but it is only a suggestion, for we must admit that as yet no very satisfactory or certain cause has been found.

III.

REPORT OF A CASE OF UNUSUAL CONGENITAL MULTIPLE DEFORMITIES.

B. E. M'KENZIE, B.A., M.D., AND H. P. H. GALLOWAY, M.D.,
TORONTO.

The patient, F. L., aged twenty years, whose photograph is shown in Figs. 1 and 2, was first examined about Jan. 1, 1900. The combination of congenital deformities which he presented was very unusual, if not unique; and this, together with the fact that the result of treatment was highly satisfactory, makes it seem desirable to place the case on record.

The examination disclosed the following facts. There was congenital *anterior* dislocation of both hips. The right foot was an extreme example of talipes equino-varus. The left foot was greatly supinated and slightly in the equinus position. The left knee presented a combination of extreme knock-knee and genu recurvatum, so that it presented a salient angle looking backward and inward. Further, when the right knee was flexed, it bent laterally instead of antero-posteriorly, and the patella was at the outer side of the limb instead of in front, this being due to the outward rotation of the femur caused by the anterior dislocation.

One would suppose that a patient the mechanism of whose lower extremities was so much out of gear would be almost incapable of locomotion; but, far from this being the case, he was fairly active on his feet, and used neither cane nor crutches. We had frequently seen him on the street during several years before he was brought for examination, and had personally observed him playing ball with other boys, and appearing to enjoy the game. His mode of locomotion was, of course, exceedingly awkward in appearance, enough so to be really painful to the lay observer; and the distortion was sufficiently hideous to affect unpleasantly persons of a sensitive temperament

who met him casually on the street. As he approached adult life, the humiliating nature of his condition made him anxious to secure relief; and he very willingly accepted the proposition that an improvement of his condition by surgical means be attempted. He was admitted to the Toronto Orthopedic Hospital, and on Jan. 12, 1900, the first operation was per-

Fig. 1.

formed. This consisted of subcutaneous section of the plantar fascia and of the tibialis anticus of the right foot, and of the plantar fascia, tibialis posticus, and the internal lateral ligament of the left foot, followed by forcible wrenching. The feet were then dressed in plaster of Paris in a greatly improved position. Eleven days later the left knee joint was excised, section of the bones being made in such planes that, when brought together, the outward rotation of the foot was corrected and the leg and thigh were in a straight line with the

exception of about ten degrees of antero-posterior flexion at the level of the knee. At intervals of from three to six weeks the feet were forcibly manipulated under anæsthesia, the position being improved each time till the deformity was practically fully corrected. The varus and supination were over-corrected before making any attempt to correct the equinus, then by tenot-

Fig. 2.

omy of the tendo Achillis, followed by forcible manipulation, the equinus was overcome. After several months had elapsed the patient's condition had been improved to a very gratifying extent; but locomotion was considerably impeded by the impossibility of flexing the right knee antero-posteriorly, to which reference has already been made. To remedy this, a final operation, osteotomy of the right femur, was undertaken on July 19, six months from the time he first entered the hospital.

The shaft of the femur was cut through with a chisel at the junction of the middle with the lower third. The lower fragment was then rotated inward sufficiently to bring the patella in front, and in this position the limb was dressed in plaster of Paris. Sound union occurred in about two months, and

FIG. 3.

antero-posterior flexion of the knee was then possible (Fig. 3). In all the patient was anæsthetized eight times. The improvement in his appearance will be best appreciated by reference to the photograph reproduced in Fig. 3. He is earning his living as a clerk in a life insurance office, does not use even a cane; and, while locomotion is somewhat stiff and ungraceful, he can walk a distance of a mile or two without discomfort.

IV.

THE ELEMENT OF TORSION IN LATERAL CURVATURE OF THE SPINE: ITS PLACE IN THE CAUSE AND TREATMENT.

(Third Paper.)

ROBERT W. LOVETT, M.D., BOSTON.

In spite of the present activity in orthopedic literature on the subject of rotary lateral curvature of the spine, our present knowledge of the mechanics of the affection is very inexact, and treatment for this reason is necessarily largely empirical. The explanations of the phenomena of scoliosis and the study of its mechanism have been written from a study of the especial structure of the human spine, particularly the distorted scoliotic spine. The curves of the articular processes have been studied, the shape of the individual vertebræ has been analyzed, the physiological curves have been considered, and a large amount of work has been expended* upon this side of the question. This literature occupies a large space, but has proved of little practical value.

The present paper is an attempt to study the element of torsion in its relation to lateral curvature,—a study not of the anatomy, but of the movements of the spine.

The anatomical work was done at the Harvard Medical School, and the writer is indebted to Professor Thomas Dwight of the Harvard Medical School for his anatomical material and for the benefit of his criticism, to Professor I. N. Hollis of Harvard College for help on the mechanics of the problem, and to Dr. Henry Feiss of Cleveland for much help in the experimental part of the work.

If one considers the human spine from the point of view of

* Riedinger, "Morphologie und Mechanismus der Skoliose," Wiesbaden, 1901.

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its evolution, one finds that the spinal column in its simplest form (Cyclostomata) consists of a homogeneous non-segmented flexible rod. The articular processes first appear in some of the fishes (Rays and Teleostei), and are general in the Amphibia (Gegenbauer).

The spinal column in the lower fishes is a simple flexible rod consisting of a series of disc-like vertebræ bound together by intervertebral elastic discs without articular processes. Higher in the vertebrate group one finds elaboration of structure and the formation of permanent antero-posterior ("physiological") curves, along with modifications of the shape of the vertebræ. But articular processes seem to have developed in the line of incidents rather than essentials, and in the higher forms to have carried out rather than radically modified the behavior of the simple fish's backbone, which is in mechanical terms a straight, flexible rod.

Articular processes in the human spine from the point of view of their evolution are therefore to be regarded as the resultants of use rather than as factors determining of themselves the motions of the spine. They are the result rather than the cause of the behavior of the spine.

The questions at issue are these:—

(1) Why does rotation of the spine on its vertical axis occur in lateral curvature?

(2) If lateral curvature is necessarily associated with rotation or torsion, may not the reverse be true, and may not rotation of the spine be necessarily accompanied by lateral curvature?

On theoretical grounds Meyer came to the conclusion in 1865* that the articular processes were not the cause of torsion, but that torsion was due to the fact that the human spine was composed of two elements,—the column of bodies and the column of arches,—and that, as the two columns possessed a different degree of elasticity, side bending must result in a torsion, since these two elements of the column did not respond in the same degree to side bendings. Since Meyer's view after long years

* Meyer, *Virch. Archiv*, 1865, Bd. 35.

of neglect has again come to the front,* it becomes of importance to examine the following aspects of the question:—

(*a*) Do the articular processes determine or cause torsion of the spine?

(*b*) Is torsion caused by the fact that the spine consists of two elements of different elasticity?

(*c*) Does the spine as a whole behave as would a flexible rod of the same size and shape independently of the two factors mentioned above, and may not torsion be explained by this fact alone?

In order to determine whether the articular processes cause torsion, and whether the united action of the two components of the human spine, the bodies and the arches, is necessary to produce torsion of the human spine in side bending, the following experiment was made:—

The column of vertebral bodies was removed from an adult cadaver by cutting the pedicles of each vertebra, and the column of vertebral bodies was observed by itself. In all respects it behaved as does the intact spine with ribs attached. Rotations and twistings followed the same formulæ as in the flexible rod and also the same formulæ as in the intact human spine. Even the lack of torsion movement in the lumbar spine, supposed to be due to the close interlocking of the articular processes, existed in the column of bodies, entirely independent of articular processes.

This demonstrated that neither the articular processes nor the different elasticity of the bodies and arches was necessary for the production of torsion in side bending, but that such torsion occurred in the column of vertebral bodies alone, and that the column of vertebral bodies alone did not differ in its behavior from that of the intact human spine.

Since, then, the whole spine behaves as would the column of bodies alone, and since the history of the spine in its evolution is that of a flexible rod increasing in complexity of structure, an investigation was then commenced to see if the spine in its movements did not behave as would any flexible rod of similar

* Albert, "Die Mechanismus der skoliotischen Wirbelsaüle," Wien, 1899; Riedinger, "Morphologie und Mechanismus der Skoliose," Wiesbaden, 1901.

size, shape, and elasticity. If such is the case, it would obey the laws of physics governing flexible rods; and as a passive instrument under certain conditions it must assume certain positions, and could not assume others so long as its structure was intact, just as a carriage will go backward or forward or may be turned to the right or left, but will not go up or down or sideways. It does not matter whether the carriage is pushed or pulled or goes of its own motive power, there are certain things that it can be made to do and others that it cannot be made to do, so long as its structure and equilibrium are intact. And, however much one carriage may differ in details from others, it is like every other so far as obeying certain general laws of physics. In the same way, spines may be grouped together in obeying certain physical laws, however much they may differ in detail.

A flexible rod—as, for example, a quadrilateral rod of rubber —in bending or twisting follows certain definite mechanical laws; and these laws can be formulated in advance by any one familiar with mechanics. A straight flexible rod can be bent in one plane without twisting; but if such a rod, originally curved in one plane, be bent in another, it must twist. It must always do this, and can do nothing else. When the top is bent forward and to the right while the lower end is held, the front turns to the left, and always to the left. A fixed combination of twisting and side bending exists for every position.

From a mechanical point of view a pure twist may be produced in a straight flexible rod without causing side displacement. There is a turning of each part of this rod in the horizontal plane, which is spoken of mechanically as *shear*, but no bending of the rod as a whole appears. But let this rod be bent already in the antero-posterior plane, and torsion of such a rod inevitably causes side displacement when viewed in the antero-posterior plane.

This was demonstrated by experiment in a quadrilateral rod of sponge rubber one inch square and eight inches long and in a quadrilateral rod of lead thirty inches long. In the latter series of experiments the lower end of the rod was fixed in a vise and

the twist given by a monkey wrench at the free upper end. In both series of experiments a twist to the left was followed by one curve, and a twist to the right by the opposite curve. These results were constant in both series of experiments.

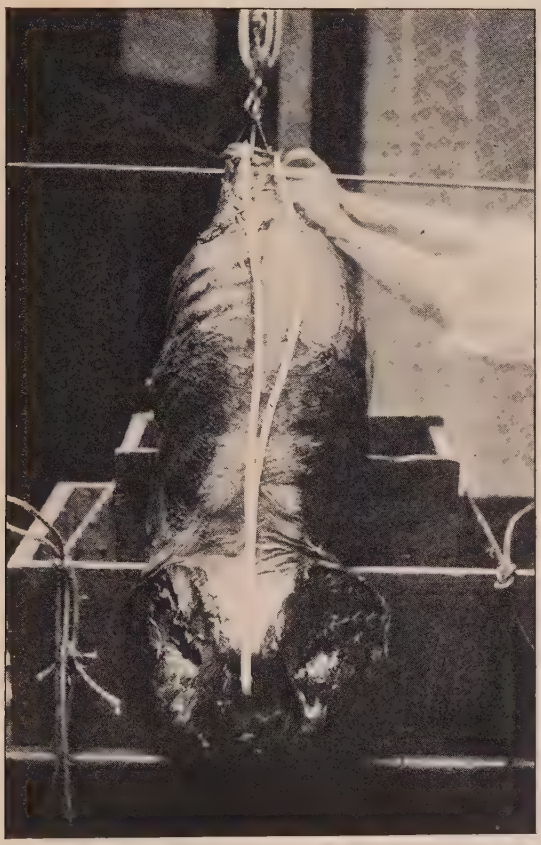


FIG. 1. COMPOSITE PHOTOGRAPH OF CADAVER.

Straight and twisted to left. The white line is a strip of cotton cloth nailed to the spinous processes. The straight white line was before twisting: the curved white line to the right is the twisted position.

The following experiments were undertaken on the human spine:—

The spine of an adult of about forty and the spine of the cadaver of a boy eighteen years old were observed. The pelvis

was firmly fastened to a box and the cervical region twisted to the right and left by the hands and by a long brass rod fastened to the third dorsal vertebra. A lateral curve always accompanied the twisting, and occurred always to the left when the twisting was to the right, and to the right when the twisting was to the left. The curve was to the same side, and followed the same rules as that observed in the lead and rubber rods.

Observations were then made on the living model. The model was a woman of twenty-five, a professional model, who was very flexible. With the pelvis fixed, active or passive twisting with the chin to the left produced a marked lateral curve to the right, with side displacement of the body to the right. Twisting to the right produced the opposite curve. The curves were of the same character and followed the same rules as those observed in the lead and rubber rods and the spine of the cadaver. In twisting with the chin to the left, the lateral curve begins at the dorso-lumbar junction and sweeps gradually out, returning in the cervical region to practically the median line. The lumbar region apparently takes little part in the lateral curve. It appeared at first as if there were a slight left lumbar curve accompanying this right dorsal curve, but careful observation and measurement on the cadaver and model showed that there was but little, if any, lumbar lateral curve. There is but little movement of torsion in the lumbar vertebræ normally, so that in spines comparatively normal it can be readily seen that any phenomena of torsion would be shown above rather than in this section of the spine.

Torsion may be carried to a much greater degree in both model and cadaver when the spine is erect than when it is fully flexed. In the erect position 90° of rotation of the top of the column was possible in both, while in the flexed position only 45° was allowed. When twisting is done in the position of full flexion of the spine, the lateral curve is located higher up than when it is done in the simple erect position; and its lower limit begins at about the seventh or eighth dorsal vertebra instead of at the dorso-lumbar junction.

The backbone of a fish and the backbone of a cat when placed in corresponding positions behave in the same way as the rubber and lead rods, the living model and the human spine and

FIG. 2.—MODEL TWISTING TO LEFT.

Illustration from former paper.

lateral bendings and torsion preserve the same relations to each other.

The result, then, of these observations is as follows:—

(1) An active or passive twist with the chin to the left in model and cadaver is accompanied by a dorsal curve to the right with displacement of the trunk to the right. In the erect position this lateral curve begins at the dorso-lumbar junction. In marked flexion the lateral curve begins at the seventh or eighth dorsal vertebra.

(2) An active or passive twist with the chin to the right is associated with a left lateral curve and a displacement of the body to the left.

It may be objected that this lateral curve is merely due to the fact that the whole thorax is twisted to one side, and that the dorsal excurvation is thus seen from its side rather than from its posterior aspect, thus giving the appearance of a lateral curve where none exists. Observations on the bodies of the vertebræ in the cadaver twisted in this way showed, however, that there was a displacement of each vertebra on the one below it, making a real curve.

Regarding the human spine, then, as a flexible rod already permanently curved in the antero-posterior plane by the three physiological curves, two propositions follow:—

(*a*) It cannot as a whole or in any part be bent to the side without twisting, as demonstrated in a former paper.*

(*b*) It cannot be twisted or rotated without acquiring a side bending.

It is desired to formulate the last-named phenomenon of twisting or torsion for two reasons:—

(1) To analyze lateral curvature by means of it to see if certain cases do not begin as a twist rather than as a side bending.

(*b*) To utilize twisting movements and manipulations in the treatment of lateral curvature.

In the application of conclusions drawn from such general laws to the treatment of scoliosis, it may be very properly objected that such laws may not apply to the movements of a twisted and stiffened spine. On the other hand, it may be true that the laws governing flexible rods, if properly studied and adapted to the especial conditions existing in such patients, may apply with especial force and may be one lacking factor in the more satisfactory treatment of scoliosis. Experiment alone will determine the fact. In any event no theoretical knowledge gained from the study of a flexible rod can be considered as applying to the human spine without confirmation by experiment on the living model and cadaver. The least

* Mechanics of Scoliosis, *Orth. Trans.*, vol. xiii. p. 251.

objection to the application of such general laws to a specific spinal distortion would be found in beginning scoliosis, the so-called postural cases; but even here experimentation would be required to establish the similarity of behavior.

FIG. 3. COMPOSITE PHOTOGRAPH OF MODEL.

Twisting to left.

The application of these facts to the study of scoliosis is of interest. Since every side bending of the spine is necessarily associated with some degree of torsion, one would expect to find that in all cases of lateral curvature of the spine, however slight, the shoulders had twisted in their relation to the pelvis, and that a line connecting two corresponding points in the shoulders was no longer parallel to a similar line in the pelvis. Looking down on a normal person in the erect position, the shoulders would not appear to be twisted with regard

to the pelvis. In all cases of lateral curvature observed by the writer, such a twisting has been found. In cases of what appear to be at first sight purely lateral postural curves, beginning scoliosis of the kind where no rotation is supposed to exist, one will find on looking down on the patient standing at ease that the shoulders are noticeably twisted with regard to the pelvis, and that one side of the shoulder girdle is carried forward and the other back. This is particularly noticeable in postural cases after they have been standing for a minute or two and muscular fatigue has commenced. Such patients, if asked to bend forward until their trunk is horizontal (Adam's position), will appear to have no rotation or torsion present, and it will also disappear in recumbency or suspension; but, viewed from above in their natural standing position, it is evident. It may also be demonstrated by placing long pieces of splint wood horizontally against the sacrum and the back of the chest above the spines of the scapulæ. This torsion is the inevitable outcome of every side yielding of the spine. But it is possible that the lateral curvature may have originated in a twist and that the side bending is secondary.

If a child holds the head naturally twisted, as is often the case, from some inequality in the vision of the two eyes or in the acuteness of hearing in the two ears, or from some similar cause, the spine will inevitably be twisted. Again, the contact of the condyles of the occiput and the articular surface of the atlas is generally best when the head is held otherwise than quite straight, which is an established anatomical fact. The twisted position of children at school in consequence of improper school furniture is another factor leading to the acquirement of a twisted position of the spine. These factors all tend to induce a twist of the spine, and a twist of the spine must in all cases be accompanied by a lateral deviation, to the right if the twist is to the left, and a curve to the left if the twist is to the right. This etiological factor has been left largely out of account in considering scoliosis.

Since the association of torsion and side bending of the spine is a constant one, as has been seen in the preceding experiments,

it may be worth while to study scoliosis in terms of torsion. That is, to study the obliquity of the shoulders in a given case in the erect position to see whether the right or left shoulder is carried forward, and, knowing then the twist of the shoulder girdle with relation to the pelvis, to see with what lateral curve a right or left twist of the shoulder girdle is associated in the given case. In this way it is possible that some light may be shed on the origin of an individual case of scoliosis, and also possibly upon the general question of rotation.

In a former paper the following conclusions were reached by a series of experiments on the spine of the human cadaver and on the living model:*—

"Lateral bending, then, in both cadaver and model in position of marked flexion is accompanied by torsion, and this torsion is in this position always in one direction, and is of the same type as the rotation seen in scoliosis; that is, backward, on the convexity of the curve, or, in other language, the bodies of the vertebræ turn towards the convexity of the lateral curve. Various attempts were made to reverse this torsion while making side bendings in the flexed position by pulling the vertebræ apart, pressing them together, etc., but in all cases in both cadaver and model the type of torsion described above persisted. . . . In the intact spine of the cadaver, therefore, and in the model, side bending in the extended position is accompanied by torsion of the vertebral bodies toward the concavity of the curve; in other words, the rotation is backward on the concavity of the curve, which is the reverse of the condition ordinarily seen in life in scoliosis."

Proceeding in the light of this to investigate scoliosis, one finds that—

(1) A simple postural curve, if acquired in the flexed position of the spine, will show a twist which may be predicted in advance. In such a curve to the left the left shoulder will be carried back and the right forward, because in such a curve the bodies of the vertebræ turn to the left, as shown in a former paper.

*Lovett, "Mechanics of Lateral Curvature," *Boston Medical and Surgical Journal*, June 14, 1900.

(2) If it is a curve originating in the extended portion of the spine,—that is, occurring in the lumbar region,—the twist will be reversed, and the right shoulder will be carried back.

That cases of single postural curves commonly show a type of torsion that is the reverse of that seen in double curves has been noted clinically by Schulthess * and others (in one-third of the cases of total scoliosis, Jach.†). That is, in a left total curve the bodies of the vertebræ may turn to the right instead of toward the convexity of the lateral curve, which is to the left. This is explained by the existence of position (2) noted above. This in my experience seems to be the common type of torsion seen in the standing position in cases of total scoliosis of the postural type.

(3) If the curve originates in a twisting of the spine rather than a side bending, the only twist observed that will cause a left curve is with the chin to the right, and therefore the right shoulder is back.

In total left scoliosis, therefore, there are three conditions which make the shoulder girdle assume an obliquity with regard to the pelvis:—

(1) A lateral curve to the left occurring in the flexed position of the spine with the left shoulder back.

(2) A lateral curve to the left occurring in the extended portion of the spine with the right shoulder back.

(3) A lateral curve to the left occurring as the result of a twisting of the spine with the face to the right, in which case the right shoulder is back.

Three reversed conditions exist, of course, for right total curves. If one takes these six conditions and rearranges them in terms of right or left shoulder back, one may construct the following table for the interpretation of simple total curves:—

If the right shoulder is back, it may be due to

(1) Right total curve acquired in flexion.

(2) Left total curve acquired in extension.

(3) Left total curve from twisting to the right.

* Schulthess, *Zeitschr. f. orth. Chir.*, vol. vi. p. 399; Kirmisson, *Rev. d. Orth.*, vol. vi.; Hess, *Zeitschr. f. orth. Chir.*, vol. vi. p. 556.

† *Zeitschr. f. orth. Chir.*, 1892, 1.

If the left shoulder is back, it may be due to
(1) Left total curve acquired in flexion.
(2) Right total curve acquired in extension.
(3) Right total curve from twisting to the left.

So far as the purely postural cases of lateral curvature are concerned, the twist of the shoulders should be easy to decipher when the relations of torsion and side bending are understood. But in the severer cases of scoliosis, where there are two curves or even three curves, a new and confusing element, that of equilibrium or adjustment, comes in, which seems to have received little attention in the consideration of the mechanics of scoliosis. The element of equilibrium must modify the behavior of the spine, because in addition to being a flexible rod it must be considered a flexible rod with a sense of balance and equilibrium. Not only is there continually an instinctive attempt when in the upright position to keep the head in the middle line of the body over the base of support, but to keep the shoulders parallel to the pelvis and the head looking approximately forward.

Were it not for this instinct of adjustment, one would expect that, as the lateral curve increased, the shoulders would twist more and more in their relation to the pelvis until in extreme cases of lateral curvature they might be twisted to an angle of 45° with the pelvis. Because, starting with a slight lateral curve, there would be a slight twist of the shoulders, and, with more lateral curve, a greater twist; but such is not the case.

In cases of more advanced scoliosis the shoulders are also twisted in regard to the pelvis, but not very much more than in the beginning cases, yet the lateral curve is much greater. To go about with the shoulders twisted 45° out of the lateral plane of the body would be an impossible condition; and, although in a slight lateral curve, the twist of the shoulders might be proportionate to the lateral element of the curve, it could not increase in the proper proportion as the lateral curve increased without resulting in an impossible and dis-

abling condition. Consequently, somewhere between the shoulders and pelvis some compensation has occurred; and the nature and seat of this compensation constitutes one of the most intricate and perplexing problems in the question of lateral curvature.

It would seem as if the twisting on a vertical axis shown in the prominence of the ribs on one side, known as the fixed rotation, in cases of scoliosis were the result of this compensation. The shoulders must be kept roughly parallel to the pelvis and the head looking approximately straight ahead. To accomplish this parallelism of the shoulders and pelvis, compensating twists (rotation) must occur in both lumbar and dorsal region; and they must be of an amount and character to keep so far as possible the top of the column pointing straight ahead. In the severe cases of right dorsal, left lumbar curve the left side will be prominent backward in the lumbar region, the right side backward in the lower dorsal region, but the axis of the shoulders again will be found backward on the left side. The instinctive sense of adjustment in keeping the atlas pointing in the same direction as the last lumbar vertebra is an important matter, demanding compensating twists in a column which has once seriously curved to the side.

Rotation in severe lateral curvature, therefore, may be the result of the patient's instinctive effort to keep the shoulders square with the pelvis. A twist is necessitated by the beginning of every lateral curve, but this twist cannot carry the shoulder plane too far out of the pelvic plane. To get the shoulders back parallel to the pelvis, a compensating twist must be added to the existing twist, and the fixed rotation thus becomes the sum of the two. This is seen when one analyzes by the aid of the scheme furnished the condition where fixed rotation exists. The reading of the scoliosis in the light of the obliquity of the shoulders is not the same as in total curves of postural scoliosis, but apparently the reverse.

Fixed rotation is not, therefore, to be overcome by a simple untwisting, but must be regarded as a compound phenomenon induced by two twists, to be dealt with by local pressure in the usual way.

As to the therapeutic use of torsion of the whole spine, it is to be remembered that in the present treatment side bending and side pressure are practically the only unilateral or non-symmetrical movements used. Wullstein alone seems to have used torsion in forcible correction, but he has used it in connection with strong traction and as an accessory measure rather than to obtain its specific effect. Many complicated free standing movements involving torsion are used, because they seem to place the spine in an improved position; but such movements, when used, are purely empirical, and take but little account of the specific effect of torsion, which has never, so far as I know, been formulated or even studied from this point of view. Side bendings in the gymnastic treatment are of great value; but it must be remembered that side bending as such does not exist, but always carries torsion with it. The trend of modern gymnastic treatment of late years has been toward laying more stress on symmetrical exercises and less on active side bendings.

The application of side force in the forcible correction of scoliosis has the theoretical and well-recognized objection that pressure must be communicated to the spine through the thorax. The ribs are movable at both ends, and a certain amount of force must be expended on the ribs before acting upon the spine. Torsion, on the other hand, acts directly upon the vertebræ. Theoretically, it has this point of advantage.

Torsion to the left with the spine erect causes, from the dorso-lumbar junction upward, a marked right dorsal curve, and the trunk is carried to the right of the median plane. If the spine is flexed before being twisted, the right dorsal curve begins higher up, at the seventh or eighth dorsal vertebra, and has the same character. Torsion to the right causes a left dorsal curve, which may be distributed through the whole dorsal region or located in its upper half, as may be desired.

Moreover, it is by no means clear that many so-called postural cases of early lateral curvature do not have their origin in a twist of the whole spine rather than in a side bending, and that the apparent side bending is only the result of the twist.

For such cases corrective twists would seem to be more rational treatment than corrective side bendings.

The therapeutic application of torsion is therefore plain. A right dorsal curve should twist or be twisted to the right, which should curve the spine to the left. Should it be a high dorsal curve, the twist should be given in full flexion of the spine. So far as the writer's experience goes, the therapeutic problem has been worked out only with regard to cases without fixed curves, where it has seemed to have a proper application and a distinctly good effect. With regard to cases with fixed curves it is not possible as yet to say what is its therapeutic value.

All that can be said at present is that torsion in the normal spine causes a distinct and uniform lateral curve, that postural cases of lateral curvature represent so slight a departure from the normal that rules governing the normal spine may be applied to them, as has been demonstrated experimentally; that postural lateral curves may apparently originate in (*a*) the flexed position of the spine, (*b*) in the extended position of the spine, (*c*) in twisted positions of the spine in which the lateral curve is only symptomatic of the twist; that in these cases torsion movements and passive torsions are of therapeutic value; and that, in general, the normal intact human spine behaves as would any flexible rod of similar curve, shape, and structure.

It is to be hoped that a further knowledge of torsion may enable us better to understand severe cases of scoliosis with fixed curves, and it is not unlikely that torsion movements and forced torsion may be of use in the correction of such cases.

DISCUSSION.

Dr. A. B. Judson.—I made a statement some years ago to the effect that "a brace is powerless to reduce lateral curvature. Its application is injurious rather than beneficial" (Transactions, vol. ix. p. 205). I should have qualified this by saying that a brace applied to produce antero-posterior pressure would be useful in treatment, although not practically efficient for absolute reduction of the deformity,—an opinion that was

especially maintained by our honorary member, Dr. Lee, in 1869 (Transactions of Pennsylvania State Medical Society, 1869, pp. 372–378).

Such an application is called for on the ground that it would transfer weight from a part of the column which swings away from the median plane to a part which is held near the median plane because it is in the wall of the cavity. It is but a repetition of the mechanics involved in the application of pressure in a case of Pott's disease, in which we try to throw the weight on the sound part of the column.

It does not seem to me to be necessary to go further, and to seek a justification of this plan in the action of a column under lateral combined with antero-posterior curving, as I have tried to show in a recent paper on the subject (Transactions, vol. xiv. pp. 273–277). A column which curves antero-posteriorly, and at the same time laterally, may be said not to have two curves, but rather one curve partaking of antero-posterior and lateral qualities,—a simple curve produced by the resultant of two forces, one acting for antero-posterior and the other for lateral curving. Can it be said that this is necessarily attended by rotation, which is motion of an entirely different kind? Is it not simpler to say that this new movement comes from something extrinsic,—viz., the arrest or delay of lateral movement in one part, while another part is free to respond more widely to the curve-producing force? The questions involved are extremely interesting, and invite thoughtful study; and I think we are very much indebted to Dr. Lovett for calling attention to the subject in his usual thorough and painstaking way.

Dr. B. E. McKenzie said that the subject was a most complicated one, and he felt quite incompetent to follow the paper that had been read,—it would require a good deal of time for satisfactory mental digestion. The point just touched upon by Dr. Taylor, and which had been brought out in both of the papers read,—*i.e.*, that the large lateral muscles of the abdomen had the power to produce lateral curvature,—was shown clinically in one very marked case which he had observed. The patient was a healthy, vigorous boy of eleven years, who had been taken ill with what was probably an anterior poliomyelitis. Some physicians had made a diagnosis of pseudo-hypertrophic paralysis, but the subsequent history proved this diagnosis to be incorrect. The paralysis affected very largely the abdominal muscles. Having been perfectly erect in the spine previously, he developed very rapidly the most extreme curvature in the lumbar region that the speaker had ever seen. the vertebræ in this region rotating about 90°, and the lateral masses projecting almost directly backward. The cause in this case could only be the loss of the staying power otherwise provided by the muscles as guys to hold the spine in position. He had understood Dr. Lovett to make certain statements regarding the spine with which he felt obliged to take issue, but on the spur of the

moment it would be difficult to formulate objections. He would congratulate Dr. Riely and Dr. Lovett on the apparatus presented. Both of them appeared to be simple in action and powerful. He was in the habit of dividing his work into two parts,—viz., (1) the application of force and (2) the training and educational value of gymnastics. The use of applied fixtures of any kind, whether jackets or braces, he had almost absolutely given up,—a position that he had maintained for ten years. He thought as much force as the human spine could endure could be applied by a simple method. If the patient were directly suspended by the arms, the latissimus dorsi muscles, having insertions near the shoulder and passing down to the crests of the ilia, became a continuous power from the hand to carry the weight of the pelvis and legs. If the body be suspended entirely by the spine and a lateral force be applied by a girth around the body until the latter be drawn to an oblique position of 45° or 50°, great corrective force is exerted, and patients can sometimes have a weight of fifty pounds additional or even more. He thought that in this way the greatest amount of force could be applied.

Dr. N. M. Shaffer said that from his studies of lateral curvature it seemed to him there were two classes of cases, one which had been very aptly described by the last speaker, and which he believed he had first described in 1876,—*i.e.*, a lateral curvature due to poliomyelitis anterior,—and another class, in which there was, as in torticollis, an arrest of development on one side. In the first class the resulting deformity was exactly that which occurred in club-foot, for instance, where the lateral muscles were paralyzed and the posterior were in a normal state, but were contracting gradually. In the second class the patients grew about a curvature which became greater, not because the muscle shortened, but because it did not grow. The greatly distorted shape of the bones in lateral curvature of the spine showed the amount of force involved in the production of lateral curvature. The upright position certainly could have nothing to do with this question: there was an element of growth against resistance, and in the direction of least resistance in nine-tenths of the cases of lateral curvature. In commenting upon Dr. Lovett's paper, as it was being read, he said to one sitting near him that he had already devised, in an inveterate case of lateral curvature in the mid-dorsal region, an operation which consisted in producing a synostosis in the contiguous articular processes. Here was the keystone of the curve, and this operation would prevent a further increase in the curve. He expected this operation would be done in a few weeks.

Dr. Wallace Blanchard said that the majority of cases of scoliosis seen by him were removed so far from the office and hospital that it was impossible for them to come with sufficient frequency to make advantageous

use of the scolitone. He thought the apparatus of Dr. Lovett met a decided want, as it was portable, could be supplied at a moderate cost, and possessed considerable and correctly applied power.

Dr. Weigel said that one should bear in mind the fact that the amount of force applied, while efficient and capable of producing a marked change in the anatomical conditions, was made for a limited time only, so that the patient was subjected to a corrective influence for only a very short period in the twenty-four hours. He understood Dr. McKenzie to say that he had discouraged the use of supports in these cases. This seemed to him a question of very vital importance. In his own mind there was no question that a case of lateral curvature could be corrected to a certain degree by the forcible methods, but in addition to this it was absolutely necessary to maintain the correction for every minute in the twenty-four hours. He believed it to be advisable to make a cast of the patient, and, after being corrected, to make a jacket over it, which will keep up all day, though perhaps in a modified form, the same kind of correction that was obtained by the forcible correction apparatus. This seemed to him a matter of the greatest practical importance. Dr. Weigel then presented a cast which had been made from a patient in whom the curvature had progressed to about the third degree. A corrective jacket had been made which, he thought, must certainly exert an influence in maintaining a better static condition of the spine than could be done by any voluntary effort on the part of the patient. He had not found any great difficulty in having his patients come every day to the office for a sufficient time to secure whatever benefit was possible from systematic treatment by gymnastics and other corrective measures.

His only object in presenting this paper jacket here again, the principle of which had been explained at the meeting at St. Louis in 1893, was because some of the members said that they had not found it satisfactory. This was because it had been finished by them with shellac, but shellac was not waterproof. He had never recommended such finishing, but had advised the use of bath enamel. He had found, however, that this sometimes chipped off, and hence he now had the jacket enamelled with five coats, and the enamel baked on. This was perfectly waterproof, and possessed very considerable strength, so that it did not twist or get out of shape, if properly made. As compared with the aluminum jacket, it was about one-third lighter.

Dr. Ridlon said that in his cases of bad lateral curvature requiring permanent support he had been in the habit of using Weigel's paper jackets. He had known them to last three years.

Dr. Bradford said that the jacket was most useful, but required care in its use, and was expensive. He had been using a jacket made of sheet

celluloid. This was easily moulded under boiling water, the hands being protected by thick rubber gloves. In this way the celluloid was made like soft leather, and could be moulded upon the cast. This made a very pretty jacket, which would ordinarily last a year, and sometimes would wear even for two years.

Dr. Lovett, in reply to Dr. McKenzie, said that he had tried to make all the propositions in his paper plain, and he wished no one to accept them without demonstrating them to their own satisfaction. With regard to the method mentioned by Dr. McKenzie (of applying force in a right dorsal left lumbar curve, for instance), if the patient were hung up by a strap over the right side of the chest and weights put upon the feet, he thought the lumbar curve would be inevitably exaggerated. Dr. Lovett showed a simple apparatus for home use in the forcible correction of lateral curvature.

V.

CLUB-FOOT STRETCHER.

GWILYM G. DAVIS, PHILADELPHIA, PA.

After a considerable experience in the straightening of club-feet by means of division of tendons and forcible manual stretching over Koenig's block and the use of wrenches resembling those of Thomas and McCurdy, I became convinced of the desirability of possessing an implement with which I could apply any amount of force desired, in the direction desired, and with the least liability of injuring surrounding structures, such as the ankle joint and leg bones.

Manual stretching, even over the block, was found ineffectual for very severe cases, unless carried to an extent which to me was unjustifiable. The persistent and repeated "maulings" —I can find no more appropriate word—to which the foot was subjected endangered its integrity and even life. The use of wrenches necessitated a most careful application of the force and holding of the ankle to avoid tearing its ligaments or breaking the bones of the leg. To overcome these objections, I took the two steel handles of the ostoclast that I exhibited before the American Orthopedic Association in 1899 (see Transactions), and fitted to them a foot-piece. The illustration shows the two handles united by a hinge at one extremity. On the upper is fastened a rubber pad. On the lower is a foot-piece which is slid along the bar and clamped at the desired place. The two supports for the heel and front portion of the foot can be separated to accommodate the size of the foot. It can be used for patients of all ages, and I have used it on infants as well as those of near adult age. In using it, the heel is placed on one support and the front of the foot on the other. The upper handle is then brought down on the arched instep or dorsum of the foot.

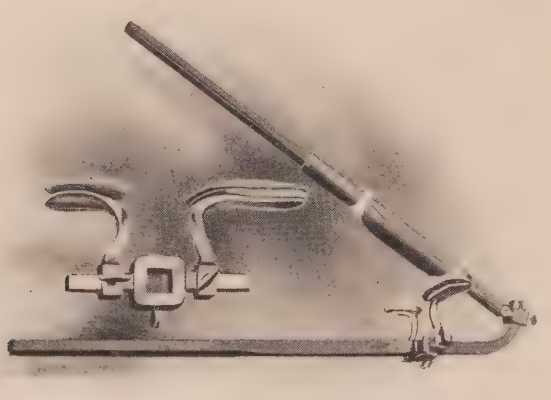
Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

In this way, by two or three pressures, a severe case can be thoroughly stretched without excessive physical exertion.

The amount of force used can be accurately controlled. If much is desired, the upper handle is placed beneath the axilla, while the lower one rests on the table.

Any amount of force can be applied to the tarsus without the slightest fear of injuring the ankle or leg bones.

In using it, I have frequently heard the ligaments crack, but have not broken even a metatarsal bone. The utmost damage done was in one case to split the skin of the sole for about an inch as the foot unfolded. This rent was closed with two catgut sutures, the foot placed in plaster, and primary union occurred.



Club-foot Stretcher, with enlarged view of the adjustable foot-piece.

VI.

THE TREATMENT OF INFANTILE SPASTIC PARALYSIS.

E. H. BRADFORD, M.D.

The treatment of this affection necessarily varies according to the extent of the disease, the age of the child, and the conditions surrounding the patient. Where idiocy is present, no treatment is practicable; but cases of impairment of the intellectual faculties often give the most satisfactory results in improving the patient's general condition and ability to move about and develop by the contact with a larger environment.

In the earliest stages it may be recorded that the surgical problem of treatment is one of training of muscles. Leaving out of consideration in this paper any question of the pathology of the affection, when cases present themselves to the surgeon, they present a disability, owing to the patient's inability to control certain groups of muscles. A balance of muscular utility is necessary for muscular efficiency. This condition does not exist in infancy, and is a process of gradual training from infancy to adult life, and in skilled occupations even in adult life the requisite muscular skill depends upon constant training of the muscles.

In spastic paralysis, owing to the central disturbance, obedience to central voluntary effort varies. A condition of what may be termed muscular rebelliousness exists in certain muscles and in the attempt at certain movements of the hand or foot. The child is in the condition of a circus driver of many horses which become tangled from inability to use the reins to each horse. If we can imagine the horses' reins varying in elasticity, the parallel will be more complete. It is necessary for the child not only to learn the connection between the mental effort and the muscular response, but to also learn the amount of effort

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needed for certain groups of muscles which is greater than that which is needed for others.

In cases which are at all advanced, the treatment is a double one, and consists not only in muscular co-ordination, but the stretching of the over-contracted muscles. In later cases still the prevention of the fibrous degeneration of muscles and the overcoming of existing hypertonicity of muscular groups are all factors in the problem. A typical case of a severe type will

Severe Infantile Spastic Paralysis.

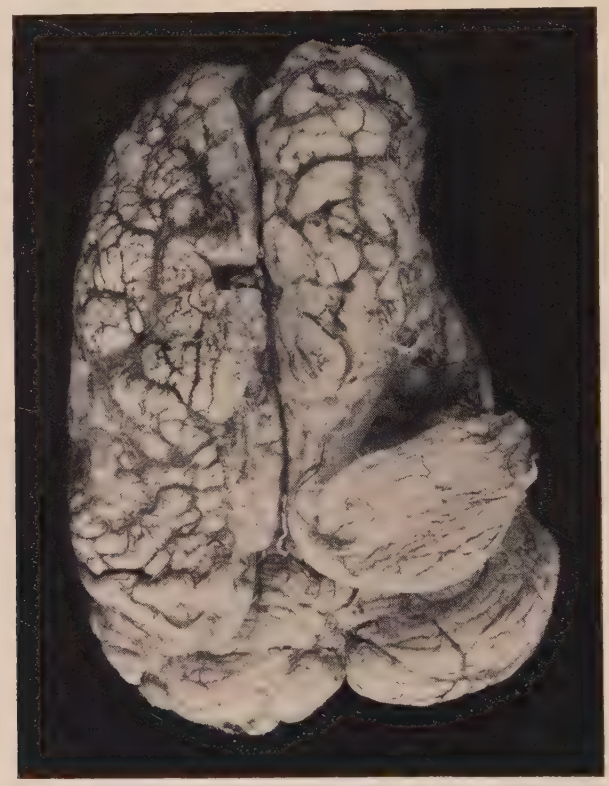
present at an early age an inability on the part of the child to stand or even sit. There may or may not be disability of one of the hands; although a certain amount of intelligence exists in all cases which are capable of treatment, yet children with this affection are usually backward, partly from the central lesion and partly on account of the deprivation on the part of the child of the natural means of mental training by locomotion or association with other children. If the child attempts to walk, the hamstrings, adductor and calf muscles, are trained in a state of hypertonicity, and all locomotion is impossible. At this stage it is customary for the patient to submit to massage and the application of electricity. It is doubtful if a sufficient amount of benefit is obtained by this treatment to justify the discomfort experienced by the child. In this early stage muscular training is of the greatest importance. Patients

should be stimulated to drag themselves or roll about in any possible way, and a gradual improvement will be observed if the child is under the care of a sensible nurse who will stimulate every effort of the child.

The first mechanical arrangement which will be found of benefit in cases of this sort is usually a wheel crutch or a baby jumper. Benefit can be obtained in utilizing the child's natural tendency to use the arms in a pulling direction; and "exercisors" arranged as a rowing machine, or a trapeze or sloping ladder, can be all utilized to strengthen the child's muscles and foster a desire for activity. Children will be found to improve gradually even in the severer cases; and an excellent arrangement can be made at this stage by the employment of parallel bars placed close together and encouraging the child to walk, the hands placed upon the bars steadying the child, and the pressure of the bars against the hips answering for a similar purpose.

When the child has reached the age of six to eight, the questions of the use of apparatus or of operative procedures suggest themselves. The use of operative procedures alone, without any tenotomy, is inadvisable, in case the muscles are of any strength. Appliances usually add to the child's disability, and prevent his developing the necessary amount of muscular training. In some cases, however, light apparatus, such as a caliper appliance for the leg or light varus or valgus ankle supports, is of benefit. Usually, however, when children have reached the ages mentioned, the question of operative interference is an urgent one. The object of operative interference is of course to restore the balance of the muscles in such a way that the hypertonicity of one group of muscles may be corrected, enabling the overweighted opposing muscles to regain a chance of development. The muscular groups which need consideration in this particular are the adductors, hamstrings, and the calf muscles. Where a condition of equinus is present, simple tenotomy is of the greatest benefit. It should be followed by fixation of the limb in a corrected position, but not in an overcorrected position, as it is particularly important not to lengthen

unduly the tendo Achillis. After the retention of the plaster of Paris for a few weeks, the use of a light ankle support with the requisite check to undue extension of the foot is desirable for a few months, after which all apparatus should be discarded and massage employed. Where the hand muscles are divided,



Distorted Brain in Case of Infantile Spastic Paralysis.

tenotomy can be used; but it has seemed to the writer that an open incision gave the surgeon more accurate knowledge of the contracted tissues. The same is true where the adductors are involved. Only a small incision is needed. The tissues are retracted, and the shortened muscular septa can be divided by scissors. The limbs should be immediately kept straight by a plaster of Paris bandage applied to the whole limb, and the

child placed upon a bed frame with, in case the adductors are shortened, adducting straps which will retain the child for a few days in a position of marked abduction of both limbs. After the wounds have healed, the child may be allowed to be lifted about, wearing caliper appliances with abducting straps at night. All appliances can be laid aside in the course of a few months.

Where, as is not infrequently the case, this condition exists in the upper extremity, operative measures of greater delicacy are needed. In a few instances a shortened condition of the pectoral muscle will be found to be present. The patient is unable to move the arm from his side. Where this is present, an incision over the shoulder and freeing completely the insertion of the pectorals upon the head of the humerus, followed by fixation of the limb in an outstretched position, will be followed by benefit.

In the more common condition, however, the hand and fore arm are the parts which are chiefly affected. The hand assumes the well-known claw position, the fore arm is flexed at the elbow, and the hand is strongly pronated. Examination of this condition shows a contraction of the biceps, a contracted condition of the pronators and of the carpal flexors. The common flexors of the fingers are usually only secondarily involved, and the condition which presents itself to the surgeon is the simplest means of overcoming the hypertonicity and contraction of the above-mentioned muscles in such a way as to enable the patient to utilize the hand.

Forcible correction of the hand and arm under an anæsthetic and a retention for some time in this position has been recommended, but it would appear from practical experience that fasciotomy or myotomy in addition to the forcible correction will give better results. In the experience of the writer the division of the intermuscular septa enables the stretching of the fibres of the contracted muscles sufficient to restore the proper muscular balance without involving extensive dissection. Tenotomy of the muscles of the hand and fore arm has not seemed to the writer as beneficial as fasciotomy.

Transplanting of the pronator radii has been done by the writer in three instances. In one of these the benefit of the procedure was marked: in the others, although a temporary benefit followed, the ultimate gain was not as great, perhaps owing to the difficulty of inserting the end of the pronator muscle in a proper position to enable it to act as a supinator, which was unusually great, owing to the shortened condition of the muscle.

A great deal of benefit can be obtained in these simple operations in the fore arm and in the hand. The writer has not found as much benefit from tendon transplantation as has been mentioned by some writers. The lengthening of the muscles by the division of the septa and intra-muscular fibrous bands, followed by over-correction, has been in several instances of marked benefit. It must, however, be clearly understood that these operations are simply a basis for careful muscular development and muscular training by use and exercises carefully suited to the patient. If these are not attended to, the benefit from the operation will be slight.

VII.

THE EARLY OPERATIVE TREATMENT OF TUBERCULOUS OSTEITIS OF THE KNEE.

BERNARD BARTOW, M.D., BUFFALO, N.Y.

Except in rare instances, when tuberculous disease of the knee begins on the tibial side of the joint, or in the periarticular tissues, the initial lesion may be referred almost universally to the femoral epiphysis. The clinical signs of its presence in that part of the bone are indicated with reasonable clearness for a considerable period of time, before consecutive infection of the joint has taken place. The focal area may acquire quite sizable proportions, and the contours of the knee become much altered, before the suggestions of its epiphyseal location are lost in the gross infiltrations which attend the spread of the disease.

Although not generally practicable immediately following the invasion of the epiphysis, to determine the site of the focus, the clinical phenomena at a little later period in the development of the disease point quite clearly to the inner condyle as its most frequent seat. This view is further re-enforced by the relatively greater exposure and frequency of trauma on that side of the articulation, as determining localization of infection. The knee joint is not immediately menaced by the presence of the disease in the epiphysis, and the search for the focal site may be deferred for quite a period of time with safety, as regards liability of its extension into the joint.

This statement receives frequent corroboration, practically, in the earlier stages of the disease, during the employment of conservative treatment. The motive for the very general recommendation of conservative treatment at that time depends, no doubt, on the fact of the focus being small and not in very close proximity to the articulation, and therefore giving rise to only a slight amount of reaction in the joint. By the temporary

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abolition of knee function in connection with this method of treatment, the encapsulation of the focus is greatly favored, and extension of infection retarded or occasionally arrested. Failing, however, by measures directed to the restraint of the joint, to control the spread of the infective process in the epiphysis, the increase of disturbance referable to the inner condyle, and musculature, may be easily noted. These become still more evident in cases in which no restraint of knee function has been employed in the earlier months of the disease. In either instance the clinical signs are adequate for determining approximately the part of the articular end of the bone which is involved, and the probable nearness of the focus to the articular surface. The symptomatology in this connection scarcely requires alluding to. The early reflex response of the muscles; the periosteal infiltration over the condyles, and the appearance of expansion or enlargement, especially of the inner condyle; and tenderness from digital pressure on the lateral aspect of the condyle,—are among the more important signs. Another phenomenon associated with the foregoing at a later period, and indicating the encroachment of the focus on the joint, is reaction inflammation in the periarticular and synovial tissues. Until this is indicated by infiltration and effusion into these tissues, it is safe to infer that the joint is in no immediate danger. This may also be present in a well-marked degree and for a considerable period of time, and still be non-tuberculous in character. It may be stated, therefore, that a well-defined period of time, of variable length, intervenes between the appearance of appreciable signs of a tuberculous focus in the epiphysis and the consecutive infection of the knee joint. Advantage may be taken of this opportunity to employ an early operative procedure, to remove the tuberculous area from the end of the bone, without intruding upon the joint or doing injury to the line of growing tissue beyond what the disease has already inflicted.

Diagnosis by the clinical signs has been emphasized for the reason that these may be, generally, relied on to locate the site of the disease with sufficient accuracy for its contemplated removal by operation. In seven cases where the operative pro-

cedure to be described was adopted, the location of the focus was ascertained without other aid. Additional information may undoubtedly be derived from the correct interpretation of skiagrams skilfully made; but absence of technical knowledge in the application of this diagnostic agent renders it valueless for the purpose of an operative guide. Reliance placed wholly on its showings might nullify the evidence derived from other entirely trustworthy sources.

The operative procedure recommended in this connection may be described as follows:—

First.—To trephine the condyle in the suspected locality. An incision about two inches long is made through the skin and underlying tissues on the lateral aspect of the condyle, exposing the capsular ligament and the periosteum just beyond its margin. The periosteum and the margin of the capsular ligament are then elevated together at the point of intended perforation of the bone. With a half-inch gouge a circular button of bone about three-fourths of an inch in diameter is removed from the condylar wall. The epiphyseal line is then penetrated in an oblique downward direction with a small bone curette, and a search made with this instrument for the softened area of bone. Ordinarily, the curette at once enters it, giving the sensation to the operator of penetrating a cavity. The greatest extent of the diseased tissue, in the cases operated on, has been found on the distal side of the epiphysis, reaching close to the articular plate. There were well-defined walls of condensed tissue limiting the focus in each instance; and, judging from the shape of the curetted cavity, the focus may sometimes have an irregular and rambling direction. Contact of the instrument with firm bone indicates the limits of the disease, and removes all doubt of the complete evacuation of the tuberculous tissue. After thorough curetting of the affected area, the surfaces of the cavity are carefully touched with 25 per cent. solution of zinc chloride, passed into it on a probe covered with a pledget of cotton. Care should be used not to touch the margins of the incisions with the zinc chloride, that primary union may not be prevented. The bone cavity is then flushed

with a 1-2000 bichloride solution, and filled with a 10 per cent. solution Ac. Carbol. and Tr. Iod. in glycerine. As much of the latter as will not run out of the wound may be allowed to remain, the surface being wiped dry, and the periosteum and skin separately sutured.

Second.—Correction of knee malposture. Flexion malposition incident to the epiphysitis is relieved by open division, within their sheaths, of the hamstring tendons. This may be done through either a longitudinal incision over the outer and inner tendons respectively or a single incision obliquely crossing the popliteal space, exposing both groups. In any instance when flexor contraction does not disappear during anæsthesia, division of the tendons is indicated, and, in the opinion of the writer, is preferable to traction or forcible stretching for overcoming the shortening of these muscles.

Theoretically, it would seem that forcible correction of such malposture was especially to be avoided, from danger of crushing in the articular plate of the condyle, which by the disease or the curetting operation may have been weakened to a degree that would not withstand much leverage force.

After these combined procedures and the suturing and dressing of all operation incisions, the limb should be fixed at once in the straight position by a plaster of Paris splint. As primary union of all operation wounds is expected, the patient may be given ambulatory privileges with crutches and high shoe at the end of a fortnight.

The removal of the tuberculous focus, and, coincidentally, eliminating irritation from mechanical sources and from reflex muscle spasm, are calculated to place the joint in a condition to manifest immediate improvement. And, accordingly, it may be seen, shortly following the operation, that the irritation phenomena are greatly modified, infiltration in the periosteal and capsular tissues rapidly absorbs, and reparative efforts in the bone progress uninterruptedly. Judging by these signs of improvement, the duration of treatment is markedly shortened as compared to that incident to conservative methods.

Preservation of joint function in this connection depends in

a large degree on the extent to which previous reaction inflammation had impaired movement. The exudate, being often non-tubercular, may be safely broken up at the time of operation, if motion in the joint, after division of the tendons, is not quite free. Careful movement of the joint in such cases should also be made at appropriate intervals after the operation. No interference with motion in the joint should be anticipated when the removal of the tuberculous focus has been made at an early stage of its development.

The earlier the attempt is made to remove the disease, the greater the probability of there being but a single focus, and that a small one. There should also be expected, at that time, relatively less disturbance from muscular contraction and reaction synovitis. Division of the hamstring tendons might thereby become unnecessary, and the complication from adhesions avoided.

The preservation of function in the flexors following the division of their tendons in the manner suggested is an assured event, if it is done strictly within the tendon sheaths. This preserves the continuity of the muscles with their points of insertion during the ensuing tendon repair. In some instances vicious contraction of these muscles necessitates extensive division of the tendon sheaths, in addition to the tendons, fascia, etc., to obtain sufficient correction of malposture. It may then become necessary to ignore their future use, and depend on the flexion power which the gastrocnemius is capable of supplying. Such cases usually recover only a very limited amount of joint movement, so the loss of the hamstrings under these circumstances is not of great importance in performing good locomotion. The elongation of the hamstring tendons also by splitting and suturing may, if practicable, be done, when the shortening is great enough to require free division of all resisting tissues back of the knee.

The removal of a limited tuberculous focus from the lower end of the femur is not a new suggestion in the treatment of articular osteitis of the knee. As a method of early radical treatment, it has not been advanced, apparently, because of uncertainty, often expressed, of the operator's ability to locate

the focus, or from the probable presence of multiple foci, which would not insure the entire removal of the disease. More than these, however, its development as an established operation, in the early stage of tuberculous osteitis, has been retarded by the claims advanced for the non-operative or conservative plan of treatment. The latter has been the almost universal plan of treatment covering the period of time between the invasion of the epiphysis and the consecutive infection of the joint. Its claims are based on the expectation of arrest of the tuberculous process by encapsulation, or reparative osteitis, in the presence of complete repose of the joint. Failure to secure such a result occurs in a large number of instances, not because the method properly applied is inadequate, in selected cases, but from faulty application and indiscriminate use. In addition there is the difficulty of obtaining the requisite co-operation during the long period of time that the conservative plan of treatment necessitates.

Its use at a time when the tuberculous osteitis has advanced so far as to make it certain that only a limited restraining influence could thereby be exerted on the disease is no doubt responsible for many such cases passing into the stage of joint involvement in connection with its employment. A radical operation for the removal of the epiphyseal focus at that time would often prevent the consecutive infection of the joint. When the latter event is impending or has occurred, there is general agreement among surgeons that the limitations of conservative methods have been reached, and that excision of the joint is demanded. Between the extremes of localization of the disease in the epiphysis and its spread from that point to the articulation there appears to be no formulated plan of treatment aside from the conservative. The opportunity afforded by the intervening developmental conditions for an early operative procedure, directed to the removal of the focus, would appear to have been but little appreciated or made use of in practice. The advantages from its extirpation while the disease is confined to the end of the femur require no comment. In view of its accessibility to operative interference, the shorter

period of treatment, the preservation of a greater amount of functional usefulness,—when these may be obtained by measures so easy of application,—one questions the propriety of recognizing the claims of conservative treatment beyond the time when the location of the disease in the epiphysis may be determined even approximately.

The plan of early operative treatment presented by the writer has been tried in his practice and by some of his confrères at his suggestion, and its merits ascertained with a degree of assurance that warrants its further employment. Of eight cases which I have quoted in this paper, two (Cases 7, 8) are still recent in point of time since treatment was begun. Their progress during that period, however, has been in keeping with cases which have been longer under observation and whose recovery is established. In none of the recovered cases has there been a relapse or a lighting up of the tuberculous process on resuming the use of the joint, after an appropriate interval of post-operative rest. Fixation of the joint has not been required beyond six months in any instance, and protection has generally been discontinued during the ensuing six months. Briefly, in the cases of more advanced development of the disease the duration of combined joint repose and protection following the operation has not exceeded one year. The time consumed in the post-operative care of the joint has been relatively less in proportion to a shorter duration of the disease prior to operation, or when its advance had been retarded by rest treatment. In one case in which the focus had been present for about six months, recovery was established, with complete preservation of the joint, in seven months following the operation.

It is not advisable to employ this procedure in cases that present evidence of even slight infection of the joint. No result could be secured thereby better than by resorting to a typical excision. Failure to establish arrest of the process in the bone by early removal of the tuberculous focus in no way impairs the result to be expected from excision of the joint, if necessitated later. In the event of a recurrence of the disease *in situ* there is nothing contraindicating a repetition of the curettement,

provided the joint has not been inavded. Should the removal of the diseased bone have been incomplete, the vent established by the trephining operation provides a ready escape for the products of tissue degeneration, and greatly lessens the danger of infection of the joint. The accompanying memoranda of cases, which are chiefly in the nature of a preliminary report, will serve to illustrate some of the conditions for which the foregoing plan of treatment was employed. End-result photographs were obtainable in only two cases in time to use in this connection, some of the patients living at a distance and trace of two of them having been temporarily lost. The treatment employed was the same in all, except Case 5, the division of the hamstring tendons being omitted in that instance from absence of contracture during anæsthesia.

A brief summary of some of the more important results obtained in the recovered cases might be conveniently mentioned. The range of preserved movement in the knee varied between complete functional restoration, in one case, and limitation of movement at 15° of flexion, in one case. Intermediate to these were four cases in which there was free flexion movement from 60° to 90° from the straight position of the leg. In the patient with the least amount of motion* the range is susceptible of further improvement by movement during anæsthesia. Extensive adhesions existing in this case at the time of operation were broken down, but recurred during the subsequent fixation of the joint. Patients whose progress has been watched after leaving the hospital have been reported well at distances of time one, two, and three years after the operation. With two exceptions these patients remained in the hospital from two to six months after the operation, affording a suitable opportunity, before leaving the institution, to judge of the controlling effect of this plan of treatment.

Case 1.—Geo. J. Male, three and one-half years old. Admitted to Children's Hospital January, 1898. No treatment previous to entering hospital. History of pain in right knee,

*In this patient the range of movement has since been increased to 45° of flexion by movement under an anæsthetic.

and lameness of about nine months' duration. Contraction of flexor muscles and malposture of 45°. Enlargement of lower end of femur and joint from periosteal and capsular infiltration. Moderate reaction synovitis. Inner condyle tender to digital pressure on its lateral aspect. (Fig. 1.)

FIG. 1. CASE 1. FIG. 2.

FIG. 1. Appearance of right knee at time of operation.
FIG. 2. Immediate correction of the malposition by division of the hamstring tendons, and fixation by plaster of Paris splint.

Operation one week later: Trephined inner condyle, and removed tuberculous focus with curette. Cavity mopped with 25 per cent. zinc chloride, and injected with Ac. Carbol. and Tr. Iod. 10 per cent. in glycerine. Hamstring tendons divided to correct malposition. Incisions sutured and dressed, and limb secured in straight position by plaster of Paris splint. (Fig. 2.)

Rapid subsidence of acute symptoms in the ensuing four weeks. Plaster splint exchanged for Thomas' knee splint at

FIG. 3 (CASE 3).

FIG. 4 (CASE 4).

FIG. 3 (CASE 3).—Appearance of left knee at time of operation (end result photograph not obtained).

FIG. 4 (CASE 4).—Appearance of right knee at time of operation (end result photograph not obtained).

the end of two months. Six months after operation all signs of disease had disappeared in knee. Free movement to 60° of flexion. Was taken home wearing Thomas' splint, which was discarded three months later. Patient reported well two years after operation.

Case 2.—F. K. Male, aged five years. Admitted to Children's Hospital Jan. 12, 1897. Tuberculous osteitis of left knee; duration, about one year. Knee flexed 50°. Abundant periosteal and capsular infiltration, with roundness of end of femur; obliteration of normal contours of knee. Joint held rigidly by muscular contraction; painful to manipulation or jarring movement; frequent night cries; inner condyle prominent and tender to digital pressure. Treatment previous to entering hospital had been by traction with weight for about three months, followed by fixation for several months with a plaster of Paris splint. Protection by crutches and high shoe for a time, and later by a long-traction walking splint, was employed intermittently.

Operation January 14: Division of hamstring tendons: knee movements were quite free when muscle restrictions were removed. Inner condyle trephined, and focus found near periphery and extending to articular plate.

Locomotion with crutches and high shoe permitted four weeks after operation. Plaster of Paris splint discontinued in August, 1897; protection by crutches and high shoe until January following. Movement at knee to 45° of flexion when protection was discarded, increasing to 90° in the ensuing year. Patient seen again in 1900, three years after operation. No recurrence of disease; function of the joint nearly equal to that of other limb; growth of limb but little affected by previous disease; no lameness apparent during locomotion

Case 3.—P. M. Male, eight years old. Entered Children's Hospital July, 1901, with tuberculous osteitis of left knee. Pronounced periosteal infiltration and roundness of end of femur, and undue prominence of inner condyle. Contraction at knee to 45° flexion. (Fig. 14.) Duration of disease about two years. Had been treated at times by fixation, extension, etc.; but treatment had been intermittent, and frequently abandoned. Joint not markedly tender, and no indications of reaction inflammation; absence of starting pains. Patient able to walk without much pain. Inner condyle distinctly tender to digital pressure.

FIG. 5 (CASE 5). FIG. 6 (CASE 6).

FIG. 5 (CASE 5).—End result nine months after operation on right knee.
FIG. 6 (CASE 6).—Appearance of right knee at time of operation.

Operation July 12: Open division of hamstring tendons to correct malposture. Focus easily found on trephining inner condyle. Its direction was transverse and irregular, not lying close to the articular plate. Hard walls of limiting tissue felt with curette in all directions. The tissue removed was largely débris, only a small amount resembling recent tuberculous tissue. This was a focus evidently of long standing, where there had been a good effort at encapsulation.

Locomotion permitted with crutches and high shoe in two weeks after operation. Splint removed in two months. Movement to 60° of flexion could then be made without discomfort. Signs of disease in end of femur had quite disappeared at that time, and patient returned home, with instructions to continue protection for a few months longer. He was heard from a year later, when there had been no recurrence of knee symptoms.

Case 4.—I. W. Female, eight years old. Admitted to Children's Hospital April 15, 1901, with tuberculous osteitis of right knee. She had been a patient in the hospital four years previous, and treated for the primary attack of epiphysitis, the present condition being a recurrence of activity in the old encapsulated focus. Treatment of the earlier disturbance had been hamstring division and fixation of knee in a corrected position, with protection by crutches and high shoe. She left the hospital at the end of six months, apparently well, and was reported so at intervals for two years. Patient returned to the hospital April 15, 1901, nearly four years later. About two months previous she had fallen on the stairs, striking the inner condyle quite hard. Following this there was pain, swelling and stiffness of the knee, and tendernesss to digital pressure in the condyle itself, which was also much enlarged from infiltration of the periosteum. Signs of moderate reaction inflammation were present in the joint. Reflex muscular contraction acute, but only a slight amount of malposture present,—about 15° of flexion. (Fig. 15.)

April 18, 1901, trephined the inner condyle, and found an old encapsulated focus with dense walls. The material removed with curette resembled osteoporis, with some débris, and recent tissue. Contraction of the flexors disappearing during anæsthesia, the division of the tendons was omitted. After operation, joint fixed in straight position by plaster of Paris splint, and locomotion permitted in two weeks. Patient left hospital six months later, her condition indicating complete removal and arrest of the disease. Movement of joint was

free to 60° of flexion. Trace of this patient has been temporarily lost since leaving the hospital.

Case 5.—H. H. Male, aged six years. Injured the right

Fig. 7 (Case 6).

Fig. 8 (Case 6).

Fig. 7.—The same, eleven months after operation.

Fig. 8.—The same, showing amount of flexion movement eleven months after operation. (This has since been increased to 45° of flexion, by movement during anæsthesia.)

knee in July, 1900, limb being caught in an extreme flexed position in a churn. The immediate disturbance soon subsided; but lameness, swelling, and pain gradually developed during the ensuing six weeks. There were attacks of acute

muscle spasm following any unusual effort, which would subside following rest in bed for a week or two. Three or four recurrences of this character occurred at intervals, during as

FIG. 9 (CASE 7).— Appearance of right knee at time of operation.

many months. The lameness was intermittent and varied in severity, but was at no time wholly absent.

Examination March, 1902, showed moderate enlargement of internal condyle, with a tender point on digital pressure on inner aspect. Moderate infiltration of periosteal tissue, and reaction inflammation in joint, were present. There had been acute swelling of the joint, noticeably following each

of the attacks of painful muscle spasm referred to. Moderate contraction of hamstring tendons and flexion, malposture of about 15°.

Fig. 10 (Case 7).

Figs. 10, 11.—Radiograms (lateral and anterior exposures) showing tuberculous focus (+) in inner condyle, right femur.

Operation April 2, 1902: Trephined inner condyle, and removed focus of moderate size. Disease area enclosed by firm limiting tissue. The flexor contraction was released during anæsthesia, and therefore no division of hamstring tendons

was made. Joint secured in plaster splint after operation, and crutch locomotion with high shoe was permitted in two weeks.

Fixation maintained by plaster of Paris splint for about three

FIG. 11 (CASE 7).

months. Movement of joint then complete and painless. Protection with crutches and high shoe continued two months longer. There were no recurring irritation phenomena after operation. Examination seven months after operation showed no indications of disease in the condyle or impairment of func-

tion of the knee joint. Have heard from patient several times since, and there has been no return of knee symptoms. Appearance of knee after recovery shown in Fig. 3.

Case 6.—H. P. Male, aged nineteen. A year and a half previous to coming under my care had hurt knee by an extreme flexion movement. Following this there was lameness, soon becoming continuous, and accompanied by swelling of the knee. Muscles gradually contracted, holding the limb immovable at 20° of flexion. The end of the femur appeared full and rounded (Fig. 4) from infiltration, and the inner condyle was prominent and tender to digital pressure. Reaction inflammation in joint and capsular tissues gave entire knee an enlarged appearance. Limb painful during locomotion, and movements resisted by reflex muscle spasm. Diagnosis of focus in inner condyle, probably near articular plate, judging by the amount of reaction disturbance in the joint.

Trephined inner condyle June 6, 1902, finding diseased area with ease. This was curetted, and bone cavity treated as in previous cases. Hamstring tendons divided to relieve contracture. Extensive adhesions were found in joint after division of the tendons, and freely broken down. Incisions sutured and dressed, and limb fixed in plaster of Paris splint. Locomotion with crutches and high shoe permitted in two weeks. Gradual subsidence of inflammatory excitement, infiltration, and swelling. Limb again moved under anæsthetic three months after operation, breaking down recurring adhesions. Splint discarded in five months, and protection discontinued three months later. Since that time, patient has borne weight on limb with aid of cane only. Movement in joint free to 15° of flexion, and expectation of further increase in range after another forcible movement under an anæsthetic. (Fig. 6.) Arrest of the tuberculous process indicated by the absence of all irritation phenomena and disappearance of infiltration around joint during the continued and gradually increasing use of limb. Appearance of knee May 8, 1903, shown in Fig. 5.

Case 7.—E. M. Girl, aged six years. Was seen in consultation with Dr. Harvey R. Gaylord, March 6, 1903. History of lameness in knee, and enlargement of end of femur, extending over one and one-half years. The latter part of that period, patient had been in the hands of a notorious quack, receiving no care whatever. At time of examination, March 6, there were extensive periosteal and capsular infiltrations, roundness of end of femur and knee joint, and marked enlargement

FIG. 12 (CASE 7). FIG. 13 (CASE 7).

FIG. 12.—The right knee two months after operation. Disappearance of much of the infiltration of the knee. Fixation and protection of the joint continued.

FIG. 13.—The same knee seventeen weeks after operation. Infiltration very much diminished. Free flexion movement to 50°. Fixation splint discontinued, but still protected by high shoe and crutches. Patient still under observation.

of inner condyle, the latter being tender to pressure on its lateral aspect. (Fig. 7.) Limitation of movement maintained by muscle contracture, holding limb rigid at about 20° of flexion.

FIG. 14 (CASE 8). FIG. 15 (CASE 8).

FIG. 14 (CASE 8).—Appearance of left knee at time of operation.

FIG. 15.—Same, eight weeks after operation, showing correction of malposture and modification of infiltration. Fixation by plaster of Paris splint and protection by crutches and high shoe continued. Patient still under observation.

Attempted movement beyond limits of restriction excited pain and muscle spasm.

Diagnosis of tuberculous focus in inner condyle, not yet involving joint, but in near relation to it.

Radiographic examination (Figs. 8, 9) confirmed diagnosis of focus occupying large area of inner condyle, the articular

surfaces being apparently free from disease. At my suggestion the treatment adopted was the same as that indicated in the foregoing cases. The record of this case has been kindly loaned to me by Dr. Gaylord, with permission to use in this connection.

Operation by Dr. Gaylord, March 6, 1903: Trephined inner condyle, and removed diseased tissue with curette. Applications of zinc chloride, etc., as in cases related. Division of hamstring tendons, and fixation of limb with plaster of Paris splint. Locomotion permitted with crutches and high shoe in two weeks. Rapid improvement in appearance of knee observed on removal of splint and change of dressings, three weeks later. Infiltration, swelling, pain, etc., had much decreased. Passive movement of joint May 7, when splint was again changed, showing motion in joint to 25° flexion. Fixation and protection continued. Appearance of knee two months after operation shown in Fig. 10.*

Case 8.—S. D. Male, aged five years. Admitted to Children's Hospital Feb. 20, 1903. Duration of lameness and pain about one and one-half years. For two months previous to entering hospital, knee had been too lame and painful to walk,—patient confined to bed during that time. Condition on entering hospital: knee flexed 45°, and fixed by muscular contracture, enlargement of inner condyle; extensive periosteal and capsular infiltration, and reaction effusion in joint (Fig. 12); pain from digital pressure on inner condyle. No radiographic examination was made.

Operation Feb. 24, 1903: Trephined inner condyle, and removed tuberculous tissue from large area extending close to articular plate. The curetted region in the condyle had hard limiting walls and very irregular form. Open division of hamstring tendons. Gastrocnemius remained contracted after releasing hamstrings, leg retaining about 10° flexion. Fixation in plaster of Paris splint. Primary union in two weeks, when dressings were changed. High shoe and crutch locomotion permitted in three weeks, with plaster splint fixation. Rapid decrease of irritation phenomena. Appearance of knee shown in Fig. 13, eight weeks after operation. Fixation and protection continued. Patient still under treatment.

*Fig. 11 shows appearance of knee two months later,—seventeen weeks after operation. Fixation splint discarded, but protection by high shoe and crutches continued. There is free flexion at knee to 50°.

VIII.

THE ELEMENT OF TIME IN ORTHOPEDICS.

CHARLES C. FOSTER, M.D.

As orthopedists, our greatest difficulty has always been the long time needed for the completion of many of our cases; and our constant effort has been to shorten that time as much as possible without impairing the perfection of our final results.

How much have we gained in the last twenty years?

How much may we fairly hope to gain in each of the various conditions we have to treat?

We must remember that these conditions are usually simply local manifestations of some central, and very often chronic, disease,—active foci in the tuberculous affections, and passive consequences in club-foot, wry-neck, the various paralyses, rickets, congenital dislocation, etc. Until this central, causative disease has run its course and passed away, there can be no certainty of permanent cure. The case is still liable to relapse, and must be kept under observation, and perhaps under treatment. Unfortunately, we are as yet unable to directly attack the causative disease, and must continue to simply patch up its consequences as best we can.

Certain cases, due not to disease, but to lack of development, form a class by themselves. Cleft palate we have left mostly to the dentists, who have made considerable improvements in artificial palates, though not in treatment of the trouble itself.

Congenital dislocation of the hip, formerly hopeless, has now become a most promising field; and the whole advance from Buckminster Brown's first, partially successful case, through the cutting operations on the acetabulum, to Lorenz's satisfactory results, has been made in our own time. I trust the end is not yet.

Presented by invitation at the meeting of the American Orthopedic Association, Washington, D.C., May 11-14, 1903.

It is difficult to state exactly the gain in time, for the time spent on such cases twenty-five years ago was really wasted.

In the various forms of paralysis little has been gained, either in character of results or in time spent. Tenotomy is used more than formerly in spastic paralysis. Infantile paralysis may prove to be an acute infectious disease, but the evidence is yet incomplete. Laminectomy for the relief of the paralysis of Pott's disease is by no means accepted as of established value. Paralysis due to brain tumor, apoplexy, or traumatism, does not belong to our field.

In club-foot much advance has been made. In very young children no better or quicker results can be obtained than by the older methods; for the greatest difficulty in these cases is usually the tendency to relapse, which may persist for several years. In older cases of average severity, plaster of Paris gives us a completeness of control over the case, and a consequent thoroughness of treatment, that often secure results that would probably have been missed without it. In the worst type of cases, the neglected adult, the gain has been greatest both in result and in time. Formerly a really good result was very rarely obtained in such cases, and then at the cost of prolonged treatment and much suffering, as in the case I reported some years ago. Now the wrench, open incision, or the removal of superfluous bone, enables us to promise at least a fair working foot to most such patients, and with little after-treatment, or tendency to relapse. Some day we may learn to tell accurately in younger cases when the danger of relapse is past, perhaps by some test like Dr. Sayre's "point-pressure"; but so far we can only keep on the safe side, and continue our after-treatment plenty long enough. Dr. Henry J. Bigelow used to divide all club-feet into two classes,—one that could pay for treatment and was cured, and the other that could not pay and was incurable. Recent advances have changed all that.

In wry-neck the open incision is of great value, and plaster of Paris makes a most excellent splint; but here also the tendency to relapse often delays the final result.

In rachitic curvatures of long bones and in knock-knee, oste-

otomy and osteoclasis have shortened the treatment of average cases, and made good results possible in severer ones.

Joint tuberculosis is a field in which modern surgery seemed to promise great things, and has certainly accomplished much; but the disease can seldom be eradicated, and the general infection is often so severe that efficient repair cannot take place until it has run its course. Resection, particularly of the smaller joints, may often prevent reinfection from that particular focus; but often that is not the only one.

Dr. Sayre's introduction of the plaster of Paris jacket was an inspiration, and is undoubtedly the best possible treatment for many cases; but many others need the rest in bed with extra feeding, that is proper for a severe case of tuberculosis of any type.

We may sum up the matter by saying that we are still working from the outside instead of from the centre; that where there is active work to be done—as in club-foot or rickets—we have gained much, but that we often have to wait while Nature does the greater part of the work in her own way, and that we shall continue to do so until further discoveries of the etiology of the causative diseases enable us to attack them directly.

IX.

THE TREATMENT OF LATERAL CURVATURE OF THE SPINE.

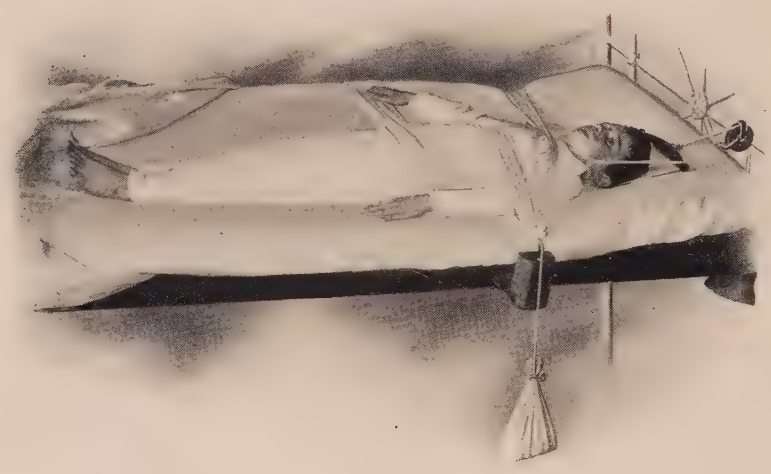
GWILYM G. DAVIS, PHILADELPHIA.

In view of the unsettled condition of both the pathology and therapeutics of scoliosis, I have thought it might be of interest to briefly submit a line of treatment, now on trial, for those cases in which rotatory deformity is marked. Its principle consists in confining the patient to bed for various lengths of time, with longitudinal and transverse traction, allowing him to rise for one to three hours daily for exercises, etc. The method of applying the traction is shown in the illustration. Weight traction by means of a sling is applied to the head. From three to ten pounds is used. If the heavy weights are used, in order to prevent the patient being dragged upward, a bandage is wound around the pelvis and just above the trochanters. From this, in front and behind, pass two bands, which are fastened to the foot of the bed. To make lateral traction, two bands pass, one from the axilla and the other from the hip, and are fastened to one side of the bed, while another band passes over the convexity of the curve, and is attached to a weight over the opposite side of the bed. This weight varies from three to ten pounds.

As heavy weights as the patient can endure with comfort are used. As yet I have not gone beyond ten pounds either for the head or side traction. By this treatment we have the weight of the body removed, and straightening of the spine encouraged by longitudinal traction and direct lateral pressure.

The patient is allowed to rise for one to three hours daily to get the fresh air, and also to practise the usual corrective exercises.

This recumbent treatment is kept up for from three to six months. I have not yet decided as to what can be accomplished by this line of treatment, but it seems promising; and I only report it with the idea of others, if they so desire, testing its value.



X.

EXCISION OF THE KNEE: A CASE.

A. J. STEELE, M.D., ST. LOUIS.

When I commenced the study of orthopedics, the operations of excision and resection of the knee joint were frequently performed. These operations were then popular because they replaced amputation, which previously had been the resort of surgeons in order to save the life of the patient. Tumor albus was a deforming disease, so far as the joint was concerned, and not unfrequently cost the patient his life. So surgeons reasoned, Better sacrifice the limb and trust to a cork leg than to entail a useless appendage on the patient, on the one hand, or endanger his life, on the other.

Twenty years ago I was struck with the numerous specimens of diseased knee joints found in the pathological museums of London. The popularity of amputation had enriched these collections.

Later and in the course of time it was suggested that as tumor albus was a local disease, or at least a local manifestation of a constitutional trouble, the joint and its diseased structures might be removed entire, cut out, and the contiguous bones approximated and so held in straight position until firmly ossified, resulting in a shortened limb with a stiff knee, but, even so, far preferable to the best of artificial limbs. This was a great advance over amputation as a surgical procedure in the therapeutics of tumor albus. But the world moves. So in this instance it was still further suggested: Why remove more than the tissue actually affected? May not this often be done, and the integrity of the joint be saved? The verdict of modern surgery is in the affirmative; and thus the operations of erasion, arthrotomy, and arthrectomy, are the established methods of to-day.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11–14, 1903

But the case is altogether different where the disease has spent itself, and there remains, as a result of the tuberculous or pyogenic inflammatory process, permanent deformity,—most likely, flexion. If true ankylosis is present, then as a surgical measure either osteoclasis or osteotomy is demanded. The former is rarely applicable in bony ankylosis of the knee

Fig. 1.

because of the marked and peculiar deformity, because of the danger of lighting up the original disease, if tubercular, and because of the uncertainty of good union. The latter—namely, cuneiform osteotomy—is, as a rule, demanded. This was practised with happy results in a case recently coming under my care:—

A boy, aged fourteen years, came under my notice six months ago, perfect in every particular except that his right knee was permanently flexed to an angle of 90°. Seven years previously he had run a needle into the joint, which lightened up a synovi-

tis. It seems that the attending physician had occasion on account of the swelling to cut into the joint. Whether the articulation became septic from the needle or from the surgical instrument we do not know; but abscesses formed in and about the joint, and continued to discharge for more than a year.

Fig. 2.

Through negligence the joint was allowed to flex to 90°, and so continued for years, deforming and rendering useless the limb. I decided that the ankylosis was "true," which opinion was confirmed by the X-ray.

Excision was plainly demanded, the only question being whether, if done now, it might interfere with the epiphyseal cartilages, and thus the growth of the limb at that point be arrested; and so would it not be better to wait until the lad had his growth? But we decided to operate at once; for, first,

the sooner the limb was made useful, the better, as he was a poor lad, and must work for a living; second, care might be taken to avoid one of the epiphyses, and thus the shortening need not be great; third, he might fall into the hands of an amputator, as had already been suggested to him, and thus the whole limb be lost. In my opinion an artificial limb is a poor substitute for the natural one, even though the latter should be imperfect in some particulars.

FIG. 3.

The operation was a simple one: A tourniquet was applied to the femoral artery, the tendo Achillis and the hamstrings were tenotomized, a U-shaped flap was turned up, the united patella was torn from the femur by chiselling underneath, a thin metal instrument was passed behind the bone, but in point of and protecting the popliteal vessels, and a cuneiform piece sawed out. So large a wedge had to be removed that the femoral epiphysis was sacrificed, but happily saving the tibial epiphyseal junction. On bringing the leg down, it was found necessary to remove an additional slice, $\frac{1}{4}$ inch thick, from the femur. This permitted good lining. Two steel nails, three inches long,

were driven upwards and backwards through the head of the tibia into the femur in holes previously made with the drill. These nails held the bones firmly. The flap was stitched, antiseptic dressings applied, and one iron rod splint arched around the knee, and with wooden foot-piece was incorporated in the plaster of Paris dressing, the tourniquet having been previously

Fig. 4.

removed. The limb was kept perpendicularly elevated for thirty-six hours, as a little oozing showed itself. The first dressing was made on the third day. The nails were removed on the eleventh day, and the wire splint was substituted by simple plaster of Paris dressing, fortified, as is my custom, with strips of galvanized wire gauze. In the fifth week he was allowed to be up on crutches. In the eighth week a leather splint shaped over a cast of the limb was laced on, which at this date he is still wearing, and will continue to use for many

weeks to come. A high sole of 1½ inches allows him to walk with but little halt.

It is interesting to note that at no time were there unfavorable symptoms,—no pain, no temperature, no pus. Both the soft and hard parts united readily.

The cuneiform specimen removed shows ossific union of the

Fig. 5.

three bones making up the knee joint. The femoral epiphyseal junction was included in the removed part, the tibial junction barely touched, so that, while there may be no more growth at the former point, it may continue at the latter.

In regard to the use of pins in this operation, I have used both ivory and bone; but they eroded, and in one case broke and separated, leaving a piece behind, followed by suppuration. Steel nails are preferable. They hold the bones in line while the dressings are being applied, and steady them until

sufficient callus has been thrown out to steady the parts. It may also be believed that they stimulate the formation of callus.

For the after-immobilization of the bones, what can possibly be better than an accurately fitting laced leather brace, fashioned over a plaster of Paris cast of the limb? I do believe that

FIG. 6.

the deforming results following excision of the knee, formerly experienced by myself and others, were largely due to the lack of efficient and persistent support. Still, I do not forget that a marked difference may exist as regards rapid and strong union after knee excision between cases of tuberculous knees and cases like the one related, where no general constitutional affection existed.

ABSTRACTS.

SCOLIOSIS.

198. Contributions to the Pathological Anatomy of the Spinal Column. By Schulthess. *Archiv f. Orthopaedie,* Bd. II. Heft 1.

A. Scoliosis.

1. Comparison of Measurements and Autopsy.

S. had the opportunity to compare the measurements taken *in vivo* by means of his well-known apparatus, with autopsical findings, in the case of a woman thirty years of age whose curvature dated from childhood. The autopsy was made over a year after the measurement, the patient having died of phthisis.

After discussion of the method of measuring and the details of this case the following conclusions are drawn:—

The investigation showed that the measurements permitted the recognition of anatomical conditions in detail. The curves of the spines correspond exactly to these of the vertebral bodies. The torsion of the thorax was also correctly shown. The conclusion is considered permissible that the picture given by the apparatus, together with the measure of torsion taken in forward bending, as well as that of pelvic slant as taken by means of his instruments, gives a perfectly reliable idea of a scoliosis.

2. Autopsy in a Case of Severe Scoliosis.

The patient was a man of forty-nine years, the subject of severe scoliosis since youth. Having suffered for a long time from slight respiratory discomfort, decided dyspnœa gradually supervened. There was pronounced venous hyperæmia of head and neck. The curve was a very severe right dorso-convex, with large rib hump and pronounced deviation of the trunk to the right, in the lumbar segment. The heart dulness enlarged both to right and left, sounds clear, but dull; some bronchitis, but no effusion; liver enlarged; no ascites, but œdema of the legs present. Suspension relieved the dyspnœa, but could not be endured for any length of time. The symptoms increased steadily, and death ensued from pulmonary œdema in several months. The changes found in the internal organs are given in detail, and do not lend themselves well to abstract. The original should be consulted.

The conclusions are:—

One of the first symptoms in these cases is stasis in the neck and facial cyanosis. A certain degree of œdema may be found here before it appears elsewhere. Gradually, the cyanosis appears in the arms and upper half of the trunk, together with evident dyspnœa and labored, shortened inspiration, though without the prolonged expiration found in emphysema. Œdema of the whole surface then supervenes, differing from that of ordinary dropsies in that it does not predominate in the lower extremities or even occur here first. Later it does not differ markedly from the heart dropsy except in the predominance of cyanosis. Death finally ensues in coma from CO_2 poisoning. These manifestations occur early in a form sufficiently grave to attract the attention of the practitioner to the menace to health and even duration of life which severe curvatures carry with them.

Although a complete cure of these symptoms is unlikely once they are present, it is always necessary to consider how far they may be influenced by the treatment of the deformity.

(Such cases as this should form a potent argument against those who still believe that a scoliosis in the young, and not of high grade, is a thing of no great consequence.)

B. Spondylitis.

A case of cervical Pott's is reported in which the autopsy showed that the odontoid process of the axis was about to perforate the dura. This condition, to which the author has before called attention, is favored by the forward position of the head which these patients are apt to present, and which should be combated by the mechanical treatment

Symptoms on the part of the vagus (frequent pulse) and hypoglossus, which were present in this case, are explained by drag upon the nerve roots, and not by pressure.

A second case is reported in which hypoglossal paralysis appeared after the application of a dressing under extension. The paralysis is here also attributed to the drag upon the nerve as the result of slipping between atlas and occiput.

These cases are reported in detail, and should be consulted in the original.

Spondylitis Anterior Superficialis.

Two autopsy reports of this interesting and unusual condition are given. They merit consideration by us especially for the reason that the subject is practically ignored by the well-known American and English text-books.

Cases are also reported of dorsal Pott's with abscess in the posterior mediastinum and one with kinking of the aorta. These are not suited to abstracting.—*A. H. Freiberg, Cincinnati.*

199. A Case of Congenital Scoliosis with Congenital Luxation of the Hip. By Vogel. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

In this case there was seen in the X-ray picture decided abnormity of the pelvis on the side of the luxation. This half of the pelvis lay several centimetres higher than the other. The os pubis and the ischium presented a peculiar torsion, which is well seen in the illustration. It resulted in a shortening of the limb, which persisted after the luxation has been reduced.—*A. H. Freiberg, Cincinnati.*

200. Congenital Scoliosis. By Athanassow. *Archiv f. orth. Chir.*, Bd. I. Heft 3, 1903.

Review of the literature and collection of reported cases. Report of a case with spina bifida, accompanied by photograms and radiograms. In this case there was rudimentary development of one-half of the third lumbar and abnormal shape of the fourth lumbar vertebræ. The shape of the second lumbar was also slightly abnormal. It seemed likely that the right halves of the third and fourth lumbar were united.

He concludes that whenever a spinal curvature appears in an otherwise healthy child at the time it begins to sit, and in the absence of any bone disease, one must think of the possibility of some congenital abnormity. The radiogram can in this case be the only medium of certainty. The radiographic reproductions are very satisfactory.—*A. H. Freiberg, Cincinnati.*

201. Rubber Pneumatic Pads in the Treatment of Severe Scoliosis and Kyphosis. By Lubinus. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

For the treatment of severe cases of scoliosis by means of corrective jackets the plaster is applied in a somewhat modified Hoffa frame and in a sitting position. The seat is adjustable, so that any desired tilt may be given to the pelvis. Instead of trying to achieve the correction before the hardening of the plaster, the author includes in the plaster dressing his pneumatic pads, deflated. One is placed over each rotation hump both anteriorly and posteriorly. A window is cut out in the diagonals opposite the pads and large enough to permit the yielding of the body when the pads are inflated, which is done by means of a bicycle pump at once after the plaster has set and as often afterward as may be necessary.

He holds the correction made by this method to have a number of advantages over the usual way, and that the force which can be exerted is much greater. He believes also that it renders the use of a head support unnecessary except in the very severest cases.

These pads are also used in the correction of Pott's kyphosis by including them either in the plaster bed or in the plaster jacket. In the latter case an opening must be cut out in front to permit yielding, just as in the case of scoliosis.—*A. H. Freiberg, Cincinnati.*

202. **Considerations on the Theory and Treatment of Scoliosis.** By Port. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

A rather lengthy discussion of this subject, without, however, furnishing any new points of view. The author believes with Maas that transformations, in the sense of Julius Wolff, cannot be accomplished in fully matured bone substance. Finished bone substance is absolutely unchangeable. Hence the importance of the epiphyseal cartilage in the production of scoliosis. Scoliosis is for this reason a disease of the developmental period, and therefore remains stationary when the period of growth has passed.

He finds:—

1. The sole cause of scoliosis is a weakening of a part of the extensor muscles of the back. This consists at first in an overstretching of this group, resulting in more or less diminution of its contractility. In the severest cases this weakening may progress to the extent of degeneration and atrophy.

2. The changes in the form of the vertebræ follow upon this primary muscle fault. An abnormal growth of the bones is brought about by the changes in pressure and tension which result from the unequal action of the muscles.

From this he frames two rules for the treatment and prognosis: 1. Scoliosis can be treated on growing individuals only, and encouragement regarding the result may be sought only in the correction of the deformity through the activity of the epiphyses. The younger the patient and the smaller the deformity, the better the prognosis. As the patients approach the end of growth, the prognosis becomes wholly bad. 2. The treatment must concern itself with the musculature in the first place if the disease is to be attacked at its root. All methods which direct efforts chiefly or exclusively toward the static conditions cannot result in permanent good.

The author recommends an apparatus which is to make possible exercise under the influence of extension. It consists of a pelvic part of celluloid made from the cast and one for the chin and occiput made in a similar manner. Four bands of steel running down from the head-piece to the pelvic part can be lengthened by screws, and thus the extension made.

The use of a corset is also recommended, which acts upon the lumbar segment only. It consists of a celluloid corset cut in two and united by means of parallelogram levers which make it possible by screw force to separate the two halves.—*A. H. Freiberg, Cincinnati.*

203. **A Study of the Anatomy, Pathology, and Etiology of Scoliosis.** By Compton Riley, Baltimore. *Jour. Am. Med. Ass'n*, vol. xlii., April 2, 1904, No. 14.

The author considers the anatomy of the spine, and points out those features which account for many of the phenomena of scoliosis.

In the consideration of the pathology he calls especial attention to the deformity of the ribs, the pelvis, and the greater length and tenseness of the abdominal muscles on the concave side. The different views as to etiology are discussed, and his own given. He then proceeds to describe the scoliotone and its method of use as a corrective agent.

The article is illustrated.—*Robert B. Osgood, Boston.*

204. **School Scoliosis and its Treatment.** By Scholder. *Archiv f. Orthopœdie,* Bd. I. Heft 3.

The general conclusions of the author regarding the prevalence and character of the scoliosis seen in school-children has been set forth in a former publication. They are repeated here. They are in effect that, in contrast to institutional statistics, scoliosis is about as frequent in boys as in girls; that the cases embraced by these same statistics are largely rachitic, and not truly habitual in their nature. Institutional reports, furthermore, deal chiefly with advanced cases, therefore with compound curves. They do not show the incredibly greater frequency of the left curves, as do the school reports.

The prophylaxis is discussed by considering seriatim the causative factors. These are held to be:—

1. Improper illumination of school-rooms.
2. Prolonging sitting position.
3. Desks not adjusted to size of children.
4. Improper position of copy-books or paper.
5. Oblique style of penmanship.

These factors are considered in detail and in a very instructive manner, but should be consulted in the original.

The home influences concerning prophylaxis and treatment are given special attention. These concern piano playing, sewing, corset-wearing, and household duties, as well as the same factors considered in connection with the school. He concludes:—

1. Weak and delicate children, and especially rachitic, should not be sent to school too early.
2. All children should be examined for unilateral flat foot and unequal length of limbs before sending them to school, in order to prevent static scoliosis.
3. Questions of illumination, writing paper, and print, should receive proper attention.
4. Adjustment of desks to the pupils should be looked after.
5. Long periods of sitting should be avoided.
6. Positions in writing should be carefully regulated, and fatigue from long-continued effort avoided.
7. Care should be given to the conditions at home, as above indicated.
8. Rules for writing, etc., are given.
9. Private lessons of all kinds after school hours are to be discouraged. Corsets to be forbidden.
10. Gymnastic exercises to be encouraged, and especially play in the open. This is discussed in detail.
11. Medical inspection regarding these points recommended.

In treatment of this class of cases, of mild grade as they chiefly are, the use of jackets and braces is to be deprecated.

The gymnastic treatment is conducted practically upon the Zander principles, and contains no new suggestions.—*A. H. Freiberg, Cincinnati.*

SPINE.

205. **Spondylitis Deformans and Ankylosing Spondylitis.** By Simmonds. *Fortschr. a. d. Gebiete d. Roentgenstr.,* Bd. VII. Heft 2.

The result of studying three hundred cases. Regarding the intervertebral discs as "bumpers" for the protection of the vertebræ, he ascribes the disease to some damage sustained by them, and resulting therefore in repeated traumatisms of the bone and consequent overgrowths. He has never seen ossifications of the ligaments, nor does he see any reason for dividing the cases into classes according to the involvement of the small joints.

Ankylosing spondylitis is a term which he reserves for a condition produced by ossification of the ligaments and the joints, but without bony overgrowth.

In the same number is an article by Fraenkel on the same subject, in which the view is expressed that it is not feasible to distinguish different *clinical* types of the ankylotic forms of spinal disease. Spondylitis deformans is for him, however, a separate disease, characterized particularly by the deformity of the vertebral bodies and the normal condition of the small joints.

The arthritis ankylopoetica runs a more rapid course, and is of graver prognosis, clinically, than the spondylitis deformans.—*A. H. Freiberg, Cincinnati.*

206. Neuropathic Spondylitis. By G. T. Troshin. *Russkii Vratch,* St. Petersburg, No. 20 (commenced in No. 18).

"This comprehensive communication from Bechtereff's clinic reports in detail a number of cases, concluding with a review of the literature on the subject of chronic ankylosing inflammation of the spine. Troshin distinguishes the Bechtereff type as a neuropathic curvature of the spine, while the Strümpell-Marie type is more in the nature of arthritis deformans. In the latter the changes in the spinal cord are similar to what is observed in arthritis deformans, and it should be regarded consequently as a trophoneurosis. Generally speaking, all the various forms of spondylitis may be considered functional affections, free from inflammatory processes. The special features of each type vary with the fundamental cause of the spondylitis."—*R. B. Osgood, Boston.*

207. Carcinoma of the Spine and Meninges Secondary to Cancer of the Breast. By F. Savary Pearce, M.D., and A. C. Buckley, M.D., Philadelphia. *Jour. Am. Med. Ass'n,* Feb. 20, 1904, vol. xlii.

A case of carcinoma of the spine and meninges secondary to a mammary carcinoma is fully reported, with the pathological findings at autopsy.

They conclude that pain from the onset is a very characteristic feature of carcinoma of the spine.—*Robert B. Osgood, Boston.*

208. Bechterew's Disease. By L. M. Pussep. *Russkii Vratch,* St. Petersburg, vol. ii., No. 32.

Ankylosis of the Spine.—Pussep draws sharp lines of distinction between the Bechterew and the Strümpell-Marie type. In a large table he gives the details of twenty-eight cases of the former, as recorded by various writers, including seven by Bechterew and twelve by other Russian writers, noting the condition of the reflexes, sensibility, muscle atrophy, etc. The article was presented at the Madrid congress.—*Abst. Jour. Am. Med. Ass'n, Feb.* 6, 1904.

209. Kuemmell's Disease of the Vertebræ. By Dr. Brodnitz, Frankfort. *Zeit. f. orth. Chir.,* Bd. XII. Heft 1 and 2.

Kümmell in 1891 described a disease of the vertebra where a rarefying process of the bodies of the vertebræ took place, following a greater or less injury of the vertebral column, after many weeks or months, and where there was a loss of substance and evident knuckle formation. Later Kümmell considered this condition, in many of the cases, to be a compression fracture of the bodies of the vertebræ, which view was held by König, Kaufman, Bähr, and others, who considered it might also be a longitudinal crack, and that dislocation first took place from the weight of the vertebral column.

Brodnitz describes a case of a man forty-five years of age, who fell from a scaffold upon his back from a height of three metres, and was unconscious when picked up. There was much exudation of blood in the region of the lower dorsal and lumbar vertebræ. For eight days the patient could not spontaneously pass his urine, although no paralysis existed. The X-ray at this time showed normal vertebræ. Ten weeks later there was a moderate posterior bending of the vertebral column in the region of the injury, which,

the patient said, he had had before the injury. X-ray still showed normal vertebræ. The patient complained of pain and stiffness in the back. Two months later there was still pain in the back, which was held rigidly and bent forward slightly. Examination showed a knuckle of the second lumbar vertebra, painful on pressure; and the lumbar region was contracted with spasm. Absolute rest in bed alleviated the pain, and after four weeks it was wholly gone, and pressure over the knuckle gave no pain. Ten weeks later the patient was without pain, but held the spine moderately stiff, and he could leave his bed. The knuckle, by appropriate treatment, had disappeared to a moderate arching backwards, which could be felt and not seen. The patient had become smaller. X-ray at this time showed that the cartilage between the first and second lumbar vertebræ had entirely disappeared, the first lumbar vertebra was much changed in its lower portion, the second lumbar vertebra was greatly pressed together in its length as well as breadth.

Brodnitz considers the cause of the change to be a true bone process, which under the influence of trauma slowly developed, and not a reabsorbed callus; and he thinks it difficult to differentiate between a rarefying osteitis and a trophoneurotic disturbance in this case, and considers it a traumatic disease of the vertebral column, as mentioned by Kümmell.—*David Townsend, Boston.*

210. **A Case of Ischæmic Affection of the Spinal Cord in Connection with Tubercular Spondylitis.** By Wieting. *Deutsch. Zeit. f. Chir.*, Bd. 70, p. 112.

Report of a case of spondylitis in a boy of eleven years, involving the dorsal region. This came on two years before, after a fall, and within a year from this time a gibbus formed. Abscess followed, and was opened. In spite of steady increase of the deformity the boy was able to walk until one month before the time of observation by the reporter, when marked œdema of both legs and paresis of both lower extremities developed. There was no ankle clonus, and no exaggerated patellar reflex. No disturbance of bowel or bladder. Disturbance of sensibility very slight. Death occurred after operation in consequence of pulmonary embolism.

The autopsy showed that the aorta was kinked to almost a right angle, and that, in consequence of the occlusion of an intercostal artery, a mural thrombus had formed in the aorta below the bend. The compression of the intercostal vessel is explained by the increase of the abscess behind it. The combined effect of this and the aortic kink was to interfere markedly with the blood supply to the lower limbs. The inferior vena cava was not obstructed. The venæ iliacæ were compressed by the descent of pus on either side into the pelvis, and were thrombosed.

It is held that these conditions are to be held responsible for the paresis. In this case the peripachymeningitis externa which was present is held blameless by the author because of slight extent. There was no sign of pressure on the cord. Microscopic examination of the cord is given.

The symptoms are therefore explained by the author as resulting from ischæmia of the cord below the kink in the aorta, and owing its existence in turn to this bend and the thrombosis combined with it.—*A. H. Freiberg, Cincinnati.*

211. **Vertebral Tuberculosis, Particularly of the Posterior Segments, also concerning the Origin of Retropharyngeal Abscesses.** By Wieting. *Archiv f. klin. Chir.*, Bd. 71, p. 479, 1903.

In the treatment of Pott's disease the more radical procedures, like Calot's redressment, have, as was to be expected, been thrust aside. The value and method of exact fixation has, however, been left as an important lesson learned from it. Many plaster jackets are merely envelopes which impose

an additional burden without really immobilizing the spine. Attention is called to the points of support upon which the efficiency of a plaster jacket depends, especially the pelvis and base of the skull. He dwells upon the impossibility of making a truly efficient jacket for some corpulent individuals.

A priori there is no good reason why we should not attack a focus of tuberculous infection if it is accessible, just as we do with the other infectious processes of the bones. The conservative methods, such as iodoform injections, treatment by hyperæmia and plaster dressings, are frequently persisted in until the time for successful operative measures, too, has passed. The results of operative methods will not be considered inferior to those obtained by conservative plans of treatment if the bad functional results of typical resections be ignored, particularly those done before the growth limit. These should not be confounded with the more modern atypical operations in which only the diseased tissue is taken away. In these cases there is really no more epiphyseal tissue lost by the operation than has already been destroyed by the disease.

This argument does not imply that every case of spondylitis should be operated upon. We must distinguish between disease of the bodies (spondylitis anterior) and disease of the arches and processes (spondylitis posterior). Although the posterior form is held by all authors to be rather rare, he has seen it nine times in seventy cases of spinal tuberculosis. These cases, treated for the most part by operation, are reported in detail. Three of these cases presented cord symptoms. The affection of the cord in so large a proportion as this is in contradiction with previous experience, as far as the posterior form of the disease is concerned. Wieting's observations are all made in Turkey, and he has himself called attention to the variation in the types of bone disease seen here as contrasted with what he had seen formerly in Hamburg.

He concludes that operation should always be undertaken once the diagnosis of posterior spondylitis is made. The character of tenderness he considers a most important diagnostic point. Pressure in the axis of the spine produces pain principally in case the bodies are involved: direct pressure to either side of the spinous processes, on the other hand, is more likely to be found in the posterior form of the disease. Indirect pressure is made by pressing gently upon the head of the standing patient.

Great stress is laid upon the appearance of abscess to either side of the spinous processes, as diagnostic of the posterior form. The abscess has but little tendency to spread.

Having been recognized and thoroughly treated, the prognosis of this form is to be regarded as distinctly better than in the anterior form of the disease. He incises in the line of the spinous processes, and, if more room is necessary, lengthens the incision rather than adds transverse cuts, in order to preserve the long muscles as far as may be.

Operation in the common anterior form must be considered differently because of the difference in accessibility of the seat of the disease. It is particularly indicated in those cases in which cord symptoms persist, the spondylitis as such having really run its course. In more recent cases, operation is indicated when the usual conservative methods have failed to relieve the cord symptoms, or even when, in the absence of these, the activity of the disease cannot be arrested in spite of the greatest care. He makes the proposal to assist the cure of the process and strengthening of the weakened column by inserting ivory pegs on the concave side of the gibbus. The spine may be reached by a lateral oblique incision, and one to three ribs resected, together with the transverse and articular processes. The plan seems virtually the same as Menard's costotransversectomy. He reports two such operations, both of which died from pulmonary embolism.

In the treatment of retropharyngeal abscess the incision in front of the sternocleido is recommended for disease of the upper third cervical: below this the posterior incision is preferred. If necessary, the muscle may be

divided transversely. If possible, our operations should here, too, approach the seat of disease. Retropharyngeal abscesses are usually the result of tuberculous infection of the glands here situated. This may result secondarily from a vertebral focus, but is without doubt often secondary to disease of the pharynx. If this is true, the glands themselves should be attacked surgically, simple drainage not being sufficient.

BONES AND JOINTS.

212. Actinomycosis or Osteomyelitis? By E. Bergmann, Berlin. *Berlin. klin. Woch.*, Jan. 4, 1904.

Bergmann commences his article with a brief discussion of actinomycosis and its fungus, and mentions several cases from different authors. He describes a case of a man twenty-nine years old which came to his clinic. He was kicked by a horse in 1898, in the region of the left knee. There was swelling and pain in the region of the patella, later on the inner surface of the thigh. In 1902 the lower portion of the thigh began to swell, and also the knee, and there was much pain. In April, 1903, he entered Bergmann's clinic. His left thigh was markedly swollen, sensitive to pressure, there was fluid in the knee joint, patella floated, and there was fluctuation on the outer side of the thigh. In the left inguinal region were three swollen lymph glands. There was no temperature. At first sight it seemed like a case of acute spontaneous osteomyelitis; but Von Bergmann considered it was not osteomyelitis because there were no signs of consequence of osteomyelitis, because the disease did not begin acutely, but had gradually developed, and had run a chronic course. Consequently, he decided it was a case of actinomycosis. X-ray showed the surface of both femora to be smooth, and the left one was thicker than the right. Von Bergmann incised the fluctuating area, and found no free pus, but gelatinous tissue with actinomycotic masses. There was a good recovery. About a month later an abscess developed on the inside of the thigh, which was incised with good recovery. This case was not accompanied, as are so many of the cases of actinomycosis, with a staphyloccus pus formation.—*David Townsend, Boston.*

213. On the Radioscopic Anatomy and Clinical Appearances of Chondral Dysphasia of the Bones with Multiple Cartilaginous Exostoses. By R. Kienböck. *Wien. med. Woch.*, No. 4752.

Nine cases of multiple cartilaginous formation of exostoses with accurate radiographic report. In several of these cases there appeared near the exostosis formation other severe changes of the bone structure (diffuse swellings, curvatures, and shortenings), which Kienböck is inclined to accept as a common congenital disturbance of the chondral portion of the bone (chondral dysphasia).—*David Townsend, Boston.*

214. Elastic Fibres and Bone Regeneration. By Grohe. *Archiv f. klin. Chir.*, Bd. LXXII. Heft 3.

The elastic fibres of adult long bones have their origin in the periosteum, and their presence is to be ascribed to the tendons, muscles, and fascia in the immediate neighborhood, by reason of the pressure and tension stresses made upon the periosteum by them.

This research concerns the behavior of the elastic fibres in cases of experimental fractures, in a few recent human fractures, and in a number of amputation stumps

The following are the conclusions:—

1. The production of new elastic fibres in and on regenerating bone depends upon the action of external mechanical influences.

2. The adaptation of these fibres depends upon the regional position and anatomic character of the bone.

3 The first new formation of elastic fibres is observed after four weeks, and after nine months there may be complete *restitutio ad integrum*. His preparations furnish no explanation of the histogenesis of the elastic fibres.

5. The stage of cartilage formation has been definitely determined in the callus of rabbits and man.—*A. H. Freiberg, Cincinnati.*

215. Experiences with the Iodoform Plug for Bone Cavities. By Von Mosetig-Moorhof. *Deutsch. Zeitschr. f. Chir.*, Bd. LXXI. Heft 5–6

The material used is a mixture of finely powdered iodoform 60.0, oil of sesame and spermaceti, each 40.0. This mass, which is stiff at ordinary temperature, becomes fluid at 50 C. It must be thoroughly shaken before using.

In using it, care must be taken that it thoroughly covers every part of the wall of the cavity and that it penetrates into the smallest crevices. Of especial importance, however, is the absolute dryness of the wound. This is accomplished by a stream of hot or cold sterilized air. The greatest care must also be taken that every particle of diseased tissue has been removed.

The finer details of the method must be studied in the original. The indications for the use of the method are chronic and circumscribed osteomyelitis, chronic bone abscess, and necrosis resulting from acute osteomyelitis.

The author describes in detail the operations for these different conditions in the various regions of the body. There follows the report of 83 operations for osteomyelitic conditions, 108 for tuberculous disease, and 8 others not belonging in these groups.

Skiagraphs accompany the paper, showing the plugs in place and their ultimate replacement by new tissue.—*A. H. Freiberg, Cincinnati.*

216. Hypertrophic Osteoarthropathy, with Report of Two Cases. By Theodore C. Janeway, M.D., New York. *Am. Jour. Med. Sci.*, October, 1903.

Janeway reports two cases of this rare disease,—both associated with purulent bronchiectasis,—illustrated with photographs and skiagrams.

Following the report of these cases is a review and analysis of the cases reported previously; and the subjects of etiology, pathology, and complications, are fully discussed.

An extensive bibliography is appended.—*John L. Porter, Chicago.*

217. The Preliminary Report of a Series of Metabolism Observations Made in Atrophic Arthritis, Hypertrophic Arthritis, Osteitis Deformans, and the Normal. By Joel E. Goldthwait, M.D., Charles F. Painter, M.D., and Robert B. Osgood, M.D., Boston, Mass. *Am. Med.*, April 2 and 9, 1904, p. 547 and 590.

These investigations were made by Mr. F. H. McCrudden in the physiological laboratory of the Massachusetts General Hospital under the direction of the writers, to obtain more accurate knowledge of the etiology, pathology, and treatment of the so-called rheumatoid conditions. The authors first define the three diseases, to avoid any confusion from misunderstanding of terms. In the atrophic form, or rheumatoid arthritis, the most marked features are the increase of normal joint fluids and infiltration of the periarticular structures. The joint proper with its cartilages shows atrophic changes very early; and, as the swelling is absorbed, these parts become smaller than normal. The hypertrophic, or osteoarthritis, presents the features of joint enlargement, and but little or no change in the periarticular structures. Much dependence is placed upon the revelations of the X-ray to establish the differential diagnosis of these cases. Osteitis deformans causes but little joint alteration, but manifests itself chiefly in the thickening and bowing of the shafts of the bones. The authors seem to consider the first two affections peculiar to adult life; but such is, unfortunately, not the case, as children have been not infrequently seen who suffered in the same manner.

A short review of the recent literature of these conditions then follows, together with the description of the methods of investigation and details of the chemic work. No conclusions follow the description of the experiments, as the number is too small; and the hope is that other investigators will pursue the subject still further, as the authors also purpose doing.—*J. T. Rugh, Philadelphia.*

218. **A Case of Multiple Bone Cysts.** By Dr. H. Heineke. *Beiträge zur klin. Chir.*, Bd. 40, p. 481.

In this case there existed rheumatic pains in the right hip and thigh, which after lasting four weeks culminated in a spontaneous fracture of the right femur while the patient was standing. An incision down to the femur revealed a cavity, the wall of which was so thin that the knife went through it with ease. It was as large as a hen's egg, and was filled with a thin brown fluid. The inner surface of the wall was smooth, and looked like serous membrane. The limb was encased in plaster of Paris, union occurring after nine months. Subsequently the patient had pain in the upper end of the right humerus, where the radiograph showed the presence of another cavity. Several other cavities were detected after a systematic X-ray examination.

A microscopic examination of the cyst wall shows three distinct layers. An inner made up of connective tissue with no epithelial lining. Here and there about the vessels of this layer pigment exists. The middle layer is 1 mm. thick, and is made up of fine trabeculæ, which have become decalcified. These trabeculæ are lined by a layer of osteoblasts.

The patient two years after the onset of the trouble still complains of pain about the bones, but is in good condition. After a consideration of the various theories regarding bone cysts, H. gives the following classification:—

I. Solitary cysts resulting from local conditions:—
   (*a*) Degenerated enchondromata.
   (*b*) Degenerated sarcomata.

II. Cyst formation resulting from general involvement of the bony skeleton.
   (*a*) Cystic formation involving the whole skeleton.
      (1) With chondroma formation.
      (2) Without chondroma formation.
   (*b*) Cysts arising during osteomalacia.
   (*c*) Cysts arising during osteitis deformans.

The author believes that his case is a general disease allied to the osteitis deformans of Paget, whose manifestation is the cyst formation; and he considers it identical with Engel's case.—*Carl Hiller, Cincinnati.*

219. **Wire Joints.** By G. Pascale, Naples. *Riforma Medica*, Palermo, No. 51 (commenced in No. 48).

Pascale illustrates a case of a new shoulder joint reconstructed with wire after extirpation of the head of the humerus on account of sarcoma. Also a wire hip joint inserted on account of subluxation and badly consolidated fracture of the neck of the femur. He also reviews the experiences of others in this line, and concludes that there is a promising future for such operations. It is possible by this means to reconstruct a joint with loops of wire. They are perfectly tolerated by the tissues, even when the excursions are quite extensive. The wire not only fastens the bones together, allowing normal function of the parts by the new joint, but maintains the normal outline of the parts, and thus favors muscular function and prevents atrophy. It also promotes the formation of new bone and regeneration of the tissues, directing and shaping the neoformation according to the normal type. He finds platinum the best metal for the wire, as it is extremely malleable and resistant. He prefers a double wire rather than a single wire of the same strength and size. The loop should be introduced to stay permanently, with no idea

of removing it later. He gives cuts of his patients, one standing on and flexing the leg in which the hip joint is one of these wire ones. It is almost impossible to detect any difference between the aspect or functioning of the two sides. The results of such operations to date, although the number is very limited, are strong testimony in their favor. The literature on the subject is reviewed.—*Abst. Jour. Am. Med. Ass'n, Feb.* 20, 1904.

220. **A Study of Gonococcus Metastasis, with Report of a Case.** By James McColgan, Grass Lake, Mich., and James Cooper, Ann Arbor, Mich. *Jour. Am. Med. Ass'n,* vol. xlii., April 2, 1904, No. 14, p. 877.

The article contains a somewhat extensive review of the literature on the subject, and the report of a case of purulent teno vaginitis of the hand. Bacteriological examination demonstrated the suspected diplococcus of Neisser. The authors, in the light of the fact that such metastatic abscesses due to the gonococcuus alone can occur in various parts of the body, urge the importance of routine examination of pus from such abscesses, especially those connected with the tendon sheaths and joints.

They point out the danger to the families and associates of these patients due to ignorance of the true nature of such conditions, and emphasize the fact that a proper diagnosis would direct the treatment.—*Robert B. Osgood, Boston.*

221. **Acute, Subacute, and Chronic Infectious Osteomyelitis: Its Pathology and Treatment.** By Edward H. Nichols, M.D., Boston. *Jour. Am. Med. Ass'n,* vol. xlii., Feb. 13, 1904, No. 7.

Introduction.—The author states that the objects of the paper are to describe the sequence of changes in infectious osteomyelitis, to emphasize the different pathological conditions that exist during the different stages, and to suggest the appropriate operative measures in the light of the pathology. The statements are based on personal work, both clinical and laboratory.

The process in an infectious osteomyelitis is essentially like that seen in a furuncle; but, beginning in bone marrow, it is surrounded by the dense shell of the cortex, and may quickly involve the whole medullary cavity.

The organism most frequently the cause is the staphylococcus pyogenes aureus. The streptococcus and pneumococcus are most apt to affect the joints and to cause a superficial bone lesion.

The lesions of the typhoid bacillus are usually of small extent and superficial.

As a rule, the organism is found in pure culture. The cases of mixed infection are usually very severe.

The disease occurs oftenest before the bones have fully developed, and in boys three times as often as in girls, almost always beginning in the diaphysis near the epiphyseal line, in the marrow.

Very extensive necrosis of the marrow may occur. The process extends quite early through the dense cortical bone, producing a suppuration beneath the periosteum. The cortical bone necroses externally in proportion to the amount of periosteum stripped off and internally to the amount of endosteum destroyed. If both are affected at the same time, complete necrosis of that portion of the shaft occurs.

For a better understanding of the repair process the author describes in detail, with illustrations, the process of repair in normal bone, and then that in osteomyelitis. The gross appearances at different stages of marrow, cortex, periosteum, and soft tissues, are treated very fully.

Under the head of symptoms the typical train is discussed, and the frequent inaccurate diagnosis condemned, recognizing, however, that many cases are a typical and the diagnosis often difficult. The diseases most frequently mistaken for osteomyelitis, the author states, are early acute tuber-

culosis of joints, acute articular rheumatism, gonorrheal rheumatism, and typhoid fever.

The *treatment* differs in the acute, subacute stages, and chronic stages. In the acute stage, absolutely free drainage, without curettage of the marrow, so that the endosteum may be left intact. Interfere with the epiphyseal line as little as possible. In the subacute stage with extensive necrosis, the removal of the entire area of necrotic bone is alone efficient.

The chief object of the article is to emphasize and illustrate the fact that by proper methods very remarkable and functionally perfect results may be obtained.

He discusses the methods for the repair of bony defects, and speaks enthusiastically of the work of Ollier.

The author's theory is given, and the technique of the operative procedures is described. The points of difference from the old operative methods are emphasized, and the *rationale* of the new clearly demonstrated. The treatment in the chronic stage is carried out in accordance with the same essential laws of growth and repair,

There follow reports of ten cases, with numerous photographs and skiagraphs, illustrative of the new methods of operation and the processes of repair.

The conclusions are carefully epitomized, and cannot well be abstracted, but should be read in full.

The article represents a rare combination of trained pathological study with large clinical experience, and would seem to revolutionize operative methods, with the promise of far more perfect results in the future.—*Robert B. Osgood, Boston.*

222. **Tubercular Joints and their Treatment.** By David C. Peyton, M.D. Jeffersonville, Ind. *Jour. Am. Med. Ass'n*, vol. xlii., No. 7, Feb. 13, 1904.

The author urges the necessity of early diagnosis. He holds that at first joint tuberculosis is a local process, originating in the synovia or in the bone. It is a bacillary infection, which, if the joint is in a healthy condition, is thrown off. The predisposing causes and the cardinal symptoms are discussed. Tuberculin is considered by the author to be "a most certain agent in rendering the diagnosis possible."

He contends that the older methods of fixation, fresh air, rest, etc., should only be employed for a short time, and that surgical measures, consisting of free incisions and frequent saline irrigations in the early younger cases and more radical operations in the advanced and adult cases, are always demanded.—*Robert B. Osgood, Boston.*

223. **Differential Diagnosis of Rheumatism and the Arthritis.** By Thos. F. Harrington, M.D. *Boston M. & S. Jour.*, Jan. 28, 1904.

The author gives a very clear presentation of the points of differentiation between the various forms of arthritis. His remark, that "no one term in medicine is accountable for more ignorance and neglect than "rheumatism," is the keynote of the refrain carried through the article. He insists that the term "rheumatism" should be confined to acute, inflammatory rheumatism, and shows conclusively that that form of arthritis furnishes a very small proportion of all the various forms that are often carelessly diagnosed as "rheumatism."

The classification of the different kinds of arthritis is excellent, and conforms to our best pathological teaching, as well as to clinical experience.

The use of the terms "arthritis deformans" and "osteoarthritis" as indicating very different pathological conditions is commendable, and the clinical differences are very well shown. Some of the forms mentioned might have been more fully dwelt upon with benefit. It is doubtful if there is a

distinct "senile arthritis" that would not pathologically fall into one of the other classes described. An arthritis to deserve the name must be something more than a "stiffness or soreness."—*John L. Porter, Chicago.*

CONGENITAL DISLOCATION OF THE HIP.

224. **Contributions to the Treatment of Congenital Dislocation of the Hip.** By Reiner. *Central. f. Chir.*, No. 2, 1904.

Recommends Schanz's manœuvre for the reduction of cases otherwise beyond the age limit. This consists in fixing the limb in that position in which the head ordinarily slips into place, when the first effort at reduction has failed. It is held there under pressure by a plaster dressing for three to four days, after which the attempt at reduction is repeated. By this means he has succeeded in replacing hips of patients up to twelve years, in bilateral, and up to fifteen, in unilateral cases. This, too, without serious trauma.

In these older patients R. proceeds to the operation without the intention of completing it in one sitting. Lorenz's usual method is begun, and stopped when the head is presumed to be against the isthmus of the capsule. In this position it is held by plaster for eight to fourteen days, and then the completion of the reduction is attempted. His successful cases required no more than two attempts.

He believes that the method acts by the continued effect of muscular tension, aided, perhaps, by the œdematous softening caused by the trauma.

The second theme of his paper concerns the after-treatment. To prevent reluxation upwards and forwards, it is important not to attempt to overcome the stiffness in adduction too soon. For this reason, motion is encouraged at first in the frontal direction only. For the same reason, while permitting active and passive gymnastics during the day, he holds the patients in the so-called primary position at night by means of a plaster shell made similarly to Lorenz's well-known plaster bed. In this the maintenance of the hyperextension is held to be of great importance.—*A. H. Freiberg, Cincinnati.*

25. **Report on Two of the Children Operated on by Lorenz.** By Harry M. Sherman, M.D., San Francisco. *Jour. Am. Med. Ass'n*, Feb. 27, 1904, vol. xlii., No. 9.

In neither of the cases was a successful or beneficial result obtained. In both cases, one confirmed by subsequent open operation, the capsule had been torn on the distal side, the head thrust through, and the remaining capsule stretched across the already shallow acetabulum. The head, by palpation, was found in both to be in the outer part of Scarpa's triangle and very close under the skin. The trochanter was internal and posterior.

In the second case, allowed to take its course after the removal of the plaster, there was no improvement in the gait, and probably more shortening than before the operation.

The article is illustrated by skiagraphs taken directly after the removal of the plaster applied by Lorenz and before any manipulation, and also those showing the end results.—*Robert B. Osgood, Boston.*

226. **The Diagnosis and Treatment of Congenital Misplacement of the Hip in Infancy.** By Albert H. Freiberg, M.D., Cincinnati, Ohio. *Am. Med.*, March 5, 1904, p. 394.

Free discussion of congenitally misplaced hips during the past few years has assigned certain definite symptoms to the condition, and this has created the impression that the diagnosis can be easily made from the gait and shortening. Freiberg calls attention, however, to the fact that there may be no limp for several years because of certain joint conditions, and that certain rachitic changes in the femoral neck or in the spine may give rise to the same

changes in the gait and posture. There exists in some cases a predisposition to luxation, in that there is an obliquity of the "roof" of the acetabulum. There is also some disparagement between the two bony structures forming the joint, but in all of these cases there is no luxation so long as the child does not walk or place his weight on the part. With the use of the leg, however, and the assumption of normal function, dislocation occurs. He also emphasizes the importance of the radiograph in determining the normality of the two hips and of the component parts, but believes it does not give so accurate a prognosis of results of treatment as does "the behavior of the joint under manipulation of the joint upon the operating table. Stability of reduction here argues for the success of the operation and *vice versa*." He reports a case of delayed attempts at walking in a child seventeen months old. Slight shortening of one leg was present, but on account of fat the trochanter and head could not be made out. The radiograph showed slight luxation with alteration of acetabulum "roof," and reduction was performed. In three weeks the child began attempts at walking, and has constantly improved, until now there is no limp at all, and the obliquity of the acetabular roof is disappearing.—*J. T. Rugh, Philadelphia.*

HIP, DISEASES AND INJURIES.

227. Hygroma of the Bursa Trochanterica Profunda. By Dr. Oscar Lippert. *Beiträge zur klin. Chir.*, Bd. 40, p. 503.

The article begins with a detailed consideration of the anatomy, it stating that the bursa trochanterica profunda is either a unilocular or multilocular sac measuring 2-4 cm. by 4-6 cm. to the external and outer portion of the trochanter major of the femur. The bursa may communicate with others situated about the hip. The condition is often tuberculous, and may be preceded by some trauma. The affection may be primary or secondary to tuberculosis elsewhere, as in the hip.

The wall of the bursa becomes thickened, and there may be formation of villi on the interior. The sac is distended with fluid, in which rice bodies are often found. As a rule, there are no special subjective symptoms except the complaint of fulness or stiffness. An examination reveals a soft fluctuating or hard mass, depending on the amount of distention. When crepitation can be felt, the rice bodies are present. The skin is movable over the swelling. The tenderness and sometimes pain is relieved in the patient by flexion, abduction, and external rotation of the extremity. These symptoms make it possible to mistake this condition for coxitis. Pressure on the heel is not painful, as in coxitis. Furthermore, the patient can bear the body weight on the limb without pain. From a tubercular osteitis of the trochanter the differential diagnosis would be difficult. The prognosis is good when the hygroma is excised *in toto*, which should be the normal treatment for all cases. When this is impossible, incision and scraping away the sac wall may be tried.—*Carl Hiller, Cincinnati.*

228. Etiology of Coxa Vara. By Borchard. *Archiv f. Orthopædie*, Bd. I. Heft 3.

Coxa vara is not to be regarded as a disease, but as a symptom complex, which may be produced by various causes, resulting in deviations in the form of that part of the femur between the trochanter major and pelvis.

The causes for these changes brought forward by him do not differ materially from those discussed in the recent literature of the subject. He mentions one case of interest, in that syringomyelia seems to have been the cause of the bone softening which permitted the bend to take place.

There are no new suggestions as to treatment.—*A. H. Freiberg, Cincinnati.*

229. **A Contribution to the Etiology of Coxa Vara without Symptoms.** (6 illustrations.) By Dr. Froelich. *Zeit. f. orth. Chir.,* Bd. XII. Heft 1 and 2, Boston, Jan. 30, 1904.

Dr. Froelich discusses briefly coxa vara since its discovery by Muller in 1888, and considers that to-day there is a symptomatic and an essential coxa vara. The essential coxa vara has such characteristic signs as germ valgum, adolescentium and pes-planus valgus. He describes the appearance of the symptomatic and the essential coxa vara as shown by the X-ray.

In the last year Froelich has examined all his cases of essential coxa vara bacteriologically, and he describes in full three cases. In two of these cases, cultures of staphylococcus albus were found. In the third case the examination was negative. He mentions two other cases, without coxa vara, one a boy of fourteen years, on whom an osteotomy for genu valgum adolescentium was done, and a culture of staphylococcus albus was obtained from a piece of the femur. He also obtained a culture of the same coccus from the navicular of a boy of thirteen, after a reduction of pes-planus valgus. In another case, which was operated on for old flat foot, no culture was obtained.

Froelich wonders if the cases of coxa vara adolescentium, as well as those of germ valgum adolescentium, pes-planus valgus adolescentium, and perhaps also scoliosis, should not be considered as chronic osteomyelitis without temperature, or, still better, osteoarthritis osteomyelitica, in which the white staphylococcus is the infecting element instead of being due to late rickets.

He emphasizes the fact that, in order to facilitate the search, the examination should be made only in the active stage of the disease, because then a positive result may sooner be obtained, and that the bacteriological examination must be a thorough one.—*David Townsend, Boston.*

230. **Rubio's Gluteal Reflex: New Sign of Hip Disease.** By O. Acevedo. *Semana Medica,* Buenos Ayres, x., No. 6.

The reflex mentioned is constant in case of incipient inflammation in or around the joint, but is never observed in hysteric or purely neuralgic affections. When percussion is applied with the fingers over the surface corresponding to the gluteus maximus, the gluteus and posterior muscles twitch as with an epileptoid tremor. The sign is most pronounced when percussion is applied at the point where the nerves pass through the sciatic notch, also along the course of the greater sciatic nerve. This phenomenon will invariably differentiate an inflammatory process from a purely nervous or hysteric affection. Acevedo has named this sign after the late Professor Rubio, as a tribute to his memory.—*Abst. Jour. Am. Med. Ass'n, Feb.* 20, 1904.

231. **Juvenile Osteoarthritis of the Hip Joint.** By Von Brunn. *Bruns' Beitr. z. klin. Chir.,* Bd. XL. p. 650.

Attention is called to the occurrence of this condition in youthful patients and to its clinical similarity to some cases of coxa vara. The case report is very interesting, and is accompanied by radiograms.

After detailed discussion of the clinical aspects of the disease the author draws the following conclusions:—

1. An arthritis deformans of the hip corresponding to the malum coxæ senile occurs in youth also. It is found in both sexes, either unilaterally or bilaterally.

2. Trauma is not to be considered as important etiologically as hitherto. The final cause of the disease is as yet unknown.

3. In the nature of the thing the symptoms will vary greatly according to the shape of the joint surfaces. They may resemble those of coxa vara very closely.

4. The limb is found most often in external rotation. Rotation inwards, abduction, and flexion may, however, be found, and in various combinations.

5. Limitation of motion may be of high degree, and may cause great impairment of function. Motion in any direction may be involved. Abduction and adduction, as well as rotation, are always somewhat limited; flexion, less often; and extension, still more rarely. Variation of the amount of rotation, according as it is tested in flexion or extension, seems to be especially characteristic.

6. Expectant treatment is indicated, to begin with. Temporary recumbency in the best possible position may be of advantage, especially when joint irritation is present. Exercises tending to antagonize the faulty position are, however, most important. Resection is not to be considered except when absolutely unavoidable.

KNEE.

232. **On the Significance of Fat Tissue in the Pathology of the Knee Joint.** (1 illustration.) By Professor Dr. A. Hoffa, Berlin. *Deutsch. med. Woch.*, March 3–10, 1904.

Fat tissue has been described in the pathology of the knee joint, the lipoma arborescens of Müller and solitary lipoma of König. Hoffa thinks that the solitary lipoma rarely occurs, and that many of the cases described as knee-joint lipoma are in reality an inflammatory fibrous hyperplasia of the intra-articular fat tissue. He describes the appearance of the normal tissues of the knee joint, lying behind the ligamentum patellæ and the normal fat tissue, as well as its microscopical appearance. This normal fat tissue may occasionally, under the influence of trauma, come to an inflammatory hyperplasia. There develops on both sides of the ligamentum patellæ a thick compact clump of fat, giving the appearance of a lipoma. The size, color, and consistency, which he describes, differentiates it from normal fat tissue. He also describes its appearance on cross section and its pathology, and concludes that the disease is a very characteristic one which we can best designate as inflammatory hyperplasia of the fat tissue underneath a growing through of the fat tissue through a compact fibrous connective tissue. He describes the changes in the tissue that lead up to this condition, and considers that the trauma may arise within the joint, as a result of the tearing off of a semilunar cartilage, or by the existence of a free body in the joint, as well as external to the joint. He describes the ordinary course of the disease. There is usually some trauma, a fall upon the knee, or a severe push against the foot, or also a twisting of the lower leg occurs beforehand, so that severe pain in the knee is occasioned. The joint is not especially swollen, and there may be evident a slight bloody exudate. After rest, massage, and ice application the first attack, as a rule, passes off. Pain on walking nevertheless persists; and, as in the attack, the pain is on the inner side of the joint. In addition, disturbances of function in the joint exist. In one case it will be that the knee cannot be properly bent, and in another backward bending of the knee is impossible. Occasionally the joint remains suddenly stationary in the flexed position, and can then only with pain and with greater exertion be straightened. There is more or less atrophy of the quadriceps and a typical swelling of the knee joint, which is situated closely below and on both sides of the patella. It is a pseudo-fluctuating swelling, which causes the ligamentum patellæ to bulge forward. The recesses above the joint, as well as the clefts on the side, remain free. But, as soon as one examines the portion laterally near the patella, he feels the doughy swelling which lies under the ligamentum patellæ. Naturally, a comparison of both knees is always necessary. If the patient forces his knees backward, the marked swelling on both sides of the ligamentum patellæ will be evident. For the rest the joint is wholly intact. There is usually normal movement, and on movement there is felt by the hand laid over the joint a slight creaking, which is quite different from the rough crepitation

which one feels in the changes of the cartilage. The joint is almost always intact, which will differentiate this condition from dislocated semilunar cartilage, tearing off of the semilunar cartilages, and the presence of free bodies in the joint. Hoffa describes in full eight of his cases, and advocates, first, after the diagnosis is made, the use of moist applications, compression bandage, massage, and wrapping up of the joint to relieve pain. If this fails, then extirpation of the fat mass through a long incision on the inside of the joint is to be employed. He strongly counsels strict asepsis and working with sterilized forceps and scissors, and under no circumstances should the fingers be introduced into the joint. For the first twenty-four hours only, he uses a strip of gauze laid in the joint to absorb the secretions and blood. After eight to ten days he removes the stitches, and immediately commences active movement of the joint. The patient is kept in bed eight to ten days, and is then massaged and given gymnastics. It takes from six to eight weeks before he regains complete use of the limb.—*David Townsend,* Boston.

233. **Two Cases of Unusual Knee Trauma Treated by a New Orthopedic Apparatus.** By Vogel. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

Two cases are reported in which, as the result of injury, there was found subluxation of the tibia backwards, and in which there was assumed injury to the crucial ligaments.

They were both treated by an apparatus which is given in illustration, and which consists of a leather socket for both thigh and leg, with a joint at the knee which is best explained by the cut, and which seems well adapted for the purpose.—*A. H. Freiberg, Cincinnati.*

234. **Lipoma Arborescens Tuberculosum of the Knee Joint.** By Charles G. Levison, M.D., San Francisco. *Jour. Am. Med. Ass'n,* vol. xlii., Jan. 23, 1904, No. 4.

Dr. Levison reports a case in which the diagnosis of hydrops tuberculosis with synovial involvement was made. The subsequent operation revealed about 120 cc. of clear yellowish serum and a mass of myriad villi springing from the post-patella bursa, and on outer side having the bursa of the quadriceps as the basement membrane. The joint was freely laid open by a transverse incision across the quadriceps above the patella, and the mass dissected out, the ends of the muscle united with catgut, and the leg put up in plaster with small gauze drainage.

Six months later the patient could bend leg to a right angle, and walked without a cane except for long distances. Microscopic examination furnished the diagnosis of lipoma arborescens tuberculosum. No tubercle bacilli were found.

The literature is reviewed.—*Robert B. Osgood, Boston.*

235. **A Method of Treatment of Bilateral Genu Valgum Adolescentium.** By Milo. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

The author has tried to unite the virtues of the two methods of forcible correction, that in one sitting and the method of Wolff in several sittings, by the use of the parallelogram compound lever. A screw being used to approximate the diagonal angles, the other diagonal angles are thereby separated. The instrument is very well shown in the illustrations. It is applied to the inner surfaces of the knees with the long diagonal parallel to the legs, and so that the concave pads with which the short diagonal is provided engage their inner surfaces. The thighs are bound together, as are the ankles, by means of stout bandages. When the long diagonal is now shortened by means of the screw, the knees are separated, and to any desired degree. The operation being done under anæsthesia, the correction can usually be accomplished in one sitting. Plaster is applied while the apparatus is still

in place, the latter being removed after it has well set. Hinges may be used in the plaster dressing or not. The compromise between the methods lies in the preliminary treatments which the author gives by means of the apparatus and upon which he lays great stress. The method has given the author uniformly good results.—*A. H. Freiberg, Cincinnati.*

SHOULDER.

236. On the Question of an Etiological Significance of the Defect of the Trapezius for the Elevation of the Scapula. By H. Neumann. *Wien. klin. Woch.*, No. 36.

Neumann considers, on the ground of one of his observed cases of defect of the trapezius, that this defect was not a cause, but only an accidental accompaniment of congenital elevation of the shoulder.—*David Townsend, Boston.*

237. On Acquired Elevation of the Scapula. (5 illustrations.) By Paul Manasse, Berlin. *Berlin. klin. Woch.*, Dec. 21, 1903.

Manasse comments briefly on the cases of elevation of the scapula found in the literature, those from Eulenberg in 1862 and 1877, and Noré-Josserand in May, 1900.

He describes a case of a nineteen-year-old girl who came from a psycopathic family, but she herself had no mental disease. In June, 1900, she had a severe attack of joint rheumatism. About a year later she noticed that the right shoulder was elevated. In May, 1901, the condition was as follows: The right scapula stood noticeably higher than the left, but both scapulæ were of equal size and shape. There was a tonic spasm of the rhomboideus and levator anguli scapuli, with a secondary weakness of that portion of the trapezius and serratus magnus which antagonized these, which had produced this elevation of the scapula. There was no improvement after a year's treatment with resisting gymnastics, massage, electricity, and apparatus. Then Manasse cut the trapezius at the border of the scapula at its middle portion, the rhomboideus from the scapula, and freed the inner, upper angle of the scapula, whereby the connection of the lev. ang. scap. with the scapula was also freed. The result was good. Six weeks later, owing to the growing together of the stumps of the lev. ang. scap. and rhomboideus, the former condition returned. Then both muscles were resected for a distance of 5 cm. After this operation a clonic contraction of these muscles appeared, which drew the scapula upwards and outwards, and which later again disappeared. The result of the operation was good. Eight days later clonic contractions, as after the last operation, appeared, and of both pectorals as well. This condition was bettered by gymnastics. Later a third operation was done, the whole levator was extirpated, and the clavicular portion of the pectoralis major was separated and the pect. minor cut at the coracoid process. After this no improvement. In the next year the patient had a maniacal attack which lasted only a short time, and after this there was gradual improvement; and at present the condition and position of the right scapula is almost perfect. Manasse thinks this case lies on the border line between neurology and surgery, and closes his article with a general consideration of the cause of these spasms. He concludes that, when the acquired elevation of the scapula is due to a tonic contraction of those structures that elevate the scapula, internal treatment should first be tried, and only when this is refused, can cutting, as well as resection and extirpation of the affected muscles, lead to a lasting removal of the condition.—*David Townsend, Boston.*

238. **A Case of Congenital Elevation of the Scapula and a Classification of the Cases hitherto Reported.** By Hibbs and Loewenstein. *Archiv f. Orthopaedie*, Bd. II. Heft 1.

A case of congenital elevation of the scapula in an adult, in which a bony process from the scapula articulated with the lower cervical spine. No treatment was instituted. The classification proposed is:—

I. Cases with a bony connection between scapula and spine.
II. Those with absence of one or more muscles of the shoulder girdle.
III. Cases with a long supraspinal process bent forward from the scapula.
IV. Those without bony outgrowth, with normal or small scapula, and with shortened or otherwise defective muscles.

The list of cases seems fairly complete with the exception of one reported by the present reviewer (*Annals of Surg.*, May, 1899), in which attention was first called to the cases of McBurney and Sands.

There are no new suggestions regarding etiology or treatment.—*A. H. Freiberg, Cincinnati.*

FOOT.

239. **The Treatment of Club-foot.** By Ghillini. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

A review presented to the Fourteenth International Congress. It is largely historical in character. Interesting is only his plan of doing the Phelps operation, if correction with the hand has not been successful by the end of the first year.—*A. H. Freiberg, Cincinnati.*

240. **The Morphology of the Foot Skeleton.** By Lazarus. *Morpholog. Jahrb.*, Bd. 24, Heft 1.

With the highly developed brain, the foot is to be regarded as the main characteristic of the human type. Whereas the coarser functions of hand and foot are united in the upper and lower extremities of the primates, a complete separation of these functions has occurred in man. Although the foot of man and monkey are built on the same general principles, nevertheless certain important differences of form are evident, which are to be regarded as the products of differing functions. The foot skeleton has, as the result of its use as a support, undergone modification in its structure which differentiates it markedly from the anthropoids. The question is put whether this difference exists to the same degree in the early periods of human development as in the adult. He discusses the forms of the human foot skeleton, its development, its relation to lower conditions. He shows that the forms and dimensions of the foot bones, the joint surfaces, the mobility of the joints, and the whole mechanism of the tarsal joints differ fundamentally in the fœtus and new-born from those of the fully developed individual. The comparison with the foot bones of the primates reveals many similarities which point toward a relation with the lower condition. A parallel exists between the supinated position of fœtus and new-born and the foot positions of the primates. This is defined in precise terms. The apelike mobility of the toes in the new-born, and especially the abduction of the great toe, are striking.

In the second part there are treated the dimensions of the foot skeleton and its component parts, in primates and man, from the embryonal period to the completion of growth. These investigations show many striking characters which man, in his early developmental stages, has in common with the gorilla; in addition, the relations of the gorilla to the other primates. The gorilla is farther removed from the orang, in this connection, than from the fœtal or even, in some regards, adult man. The most important cause in this is the increase of static function resulting from the erect position, on

the one hand, and the loss of function by absence of grasping, on the other. This is accounted for by the development of the tarsal region and the reduction in size of the toes. In the fœtus the tarsus shows comparatively less development than in the adult. The toes are proportionately long. Here lies the greater similarity in its foot to that of the gorilla than the foot of the human adult.—*Abst. Zeit. f. orth. Chir.*, xi., 3.

241. The Normal and the Flat Foot. By Engels. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

An endeavor to show that many of the prevailing views regarding the anatomy and physiology of the foot are based upon fallacious premises,—that, for example, there is no longitudinal arch to the foot. Attempts hitherto made to study the physiology and pathology of the foot by means of the X-ray have been of little value because of imperfect technique. This requires a constant position of the foot, of the tube, and the possibility of changing the plates without disturbing either foot or tube. He has constructed an apparatus by means of which this is possible. He has thus been able to take accurate measurements of the foot at rest and under weight, as well as to study the structure of the bones. The weight-bearing power of the foot lies in the muscles both of foot and leg. It must be looked upon therefore as a living unit in order to obtain trustworthy results.

Attention is first directed to the internal structure of the bones in the belief that, just as the arrangement of the spongiosa depends upon the degree and direction of the stresses which the bone has to bear, so the study of the internal structure may be expected to give a clew to the amounts and directions of such stresses.

The study of this brings him to two generalizations:—

1. Wherever pressure stress is evident, a rectilinear arrangement exists, and without regard to the limits of individual bones.

2. These pressure bundles are always placed perpendicular to their respective joint surfaces.

Conclusion: the spongy structure is found arranged in the lines of force, the joint surface at right angles to them.

The impression of the prevalence of rectilinear arrangement is given by two systems of trabeculæ which monopolize the side view of the foot skeleton and which cross at right angles in the trochlea of the astragalus. The strength of these systems tells that they are the principal weight-bearers. Their direction shows the manner in which the weight is distributed. The longitudinal arch of the foot is an arch only in the sense of outward appearance, not in function. This appearance is produced chiefly by the bony ridge along the middle of the lower surface of the calcaneus. This has, however, no pressure function, but, on the contrary, one of tension, principally as the insertion of the long plantar ligament. The few groups of curved lines to be seen in the foot are quantitatively and qualitatively so insignificant that he holds it impossible to recognize a "structural" longitudinal arch. The only arch structures in the foot are within the limits of individual bones, and are strictly local in significance.

Important and interesting as they are, it is impossible for us to follow the author through his examination of the structure of the various bones; but we give his summary on account of its importance:—

The foot is a system of rectilinear buttresses which are maintained in their mutual positions by the muscles and ligaments of the sole. We may distinguish a principal and an accessory system, which are not, however, opposed functionally, but are compensatory. The anterior spreads into the metatarsal heads, the posterior into the tuber calcanei. The anterior principal system, which corresponds in a general way to Lorenz's inner arch, is composed of the first three metatarsals, the cuneiform bones, the scaphoid, head of the astragalus, and its neck. It is entirely rectilinear. The anterior accessory system corresponds partly to Lorenz's external arch, and comprises metatar-

sus IV. and V., the cuboid and os calcis to the posterior joint surface. Its rectilinear character is disturbed by pressure effects coming from the main system, but *it does not constitute an arch.* The main and secondary anterior systems are united in the form of a transversely concave furrow, which is maintained by muscular action and by the concentric effect of the burden itself. The posterior buttress, extending from the trochlea of the astragalus to the tuber calcanei, is complicated by the insertion of a supination joint between talus and calcaneus. This necessitates an anterior support for the calcaneus, and therefore an internal system of pressure and tension trajectories. The posterior and main anterior buttresses meet in the trochlea of the talus, posterior and accessory anterior buttresses just below the posterior calcaneus joint.

There follows a description of the measurements taken by means of the X-ray of the foot in its unburdened and weighted condition. It is impossible to abstract this portion: it is a matter of detail. His conclusions are, however, interesting. Emphasis is laid upon the importance of the plantar fascia in binding the tuber calcanei with the metatarsal heads. None of the long leg muscles take in the tuber calcanei in their action: the same is true of the other ligaments of the foot. From these considerations it is concluded that the duty of maintaining the longitudinal tension of the foot, and therefore of maintaining the hollow of the foot, falls to the foot musculature proper. The task of supporting the foot laterally, so that the transverse arching is held, belongs to the long muscles. Concerning the function of these the author holds views which differ from those commonly accepted. The peroneus longus has as its principal action the support of the transverse arch, through its passage across the sole; and the tib. post. assists by pulling in the opposit direction. This pertains to the ordinary and indifferent position of the foot. Under one-sided burden the one or other muscle stiffens that side of the transverse arch in which its tendon ends by pressing the bones together into the most advantageous position.

Concerning the normal position of complete rest the author points out that we practically never stand completely at rest, but that there is always a play of muscles, now transferring the weight from heel to ball, now from inner to outer edge of sole, now from one foot to the other. The position of rest changes with our varying occupations. In resting upon the sole, the calcaneus represents only the posterior of two buttresses, transmitting its share of the burden to the ground, from which it receives the counter-pressure necessary to prevent its being pulled forward by the tension stress acting upon it.

When the foot rises upon the ball, the mechanism is entirely different. The stresses upon the front foot and the lower ligaments are changed quantitatively only. The heel, however, loses its counter-pressure from the ground, and consequently its hold, which is, however, supplied by the pull of the gastrocnemius. The mechanism of the position is now discussed, and is illustrated by means of diagrams without which it is difficult to explain. The theory appears to be very plausible. The position on the ball of the foot, when not extreme, is held to be easier and longer endurable than that on the sole. The reason for it being unendurable for a long time, *when uninterrupted,* lies in the small surface applied to the ground, requiring an extra amount of muscle work to maintain the balance.

The mechanism of walking is also described on the same principles. There is also given a description of the apparatus by means of which the radiograms were made, and which is illustrated.—*A. H. Freiberg, Cincinnati.*

242. Hallux Valgus. By Roepke. *Deutsch. Zeit. f. Chir.,* Bd. LXXI. Heft 1.

Volkmann's view of this affection was that it belonged in the category of chronic deforming inflammatory processes. As the result of the careful

study of twenty-three cases, and especially by means of the radiogram, the author feels able to reject this explanation. After describing the pathological changes found in the joint, he finds that, where there has been no contact of the joint surfaces, there is atrophy; where increased stress has been borne, increase of tissue has occurred. He therefore looks upon the deformity as produced by changes in static conditions, in the sense of Wolff's law.

He sees the initiative to this in the effect of improper foot-gear. The change in the action of the flexor hallucis is held to be the most important secondary effect of this. The internal lateral ligament makes sufficient pull upon its point of insection to prevent atrophy at this place. In fact, some hypertrophy may occur. The bunion is therefore looked upon simply as the median part of the metatarsal thrown out of function by the lateral deviation of the phalanx and the median deviation of the metatarsus, respectively.

The treatment depends upon the severity of the case and the complications. When once the valgus position becomes fixed, operative treatment is indicated. Schede's method, of chiselling off the internal projection of the joint, is followed by relief of symptoms, but not by radical cure. The various resections of the joint are rejected as unnecessarily mutilating. Reverdin's method is recommended. This consists in the Schede operation, if the radiogram shows it to be desirable, but also in the cuneiform osteotomy of the metatarsal just proximal to the bunion. The resulting wound is left open. Should suppuration of the bursa be present, this must first be allowed to heal after incision. A small splint is used in the after-treatment. Tenotomy and removal of the sesamoids are regarded as unnecessary. Radiograms and case reports are given.—*A. H. Freiberg, Cincinnati.*

243. **Morton's Painful Disease of the Toes.** By Walter G. Stern, M.D., Cleveland, Ohio. *Am. Med.*, Feb. 6, 1904, p. 221.

Stern reviews the literature of this condition, and refers to the three theories of its etiology. (*a*) The French school does not recognize such a disease, but refers the peculiar pains to fracture, inflammatory lesions, callosities, etc. (*b*) Morton believed it to be due to pressure on a branch of the plantar nerve, which wound about the neck of the metatarsal, by the head of the next outer metatarsal; but Halstead has shown such a condition does not exist,—namely, that the metatarsals do not hold such relationships, and that the nerves do not wind about the necks of the bones. (*c*) The majority of orthopedists believe that the condition is a static one, which involves the transverse arch of the foot, and is analogous to flat foot. There is alteration in the relationship of the heads of the metatarsals, and frequently the second one rests flat on the floor and develops a callosity.

Almost all sufferers belong to the higher classes, have been subjects of tight and narrow shoes which have weakened the foot. The pain is sudden in onset and agonizing. It may leave as suddenly. The foot is usually found to be broader than ordinary. The transtarsal arch is absent or much broken. The fourth metatarsal is tender, but not swollen or red, and is at times subluxated.

Morton's treatment was resection of the head of the fourth metatarsal, but the present-day treatment is to restore the arch by a pad or plate, and give a properly fitting shoe. A number of cases are detailed, illustrating this form of treatment and the success which followed it.—*J. T. Rugh, Philadelphia.*

244. **On Reduction of Congenital Club-foot in Adults** (with Demonstration of a Case, Fifty Years of Age, which had been reduced). (3 illustrations.) By Dr. Ernst Mayer, Cologne. *Zeit. f. orth. Chir.*, Bd. XII. Heft 1 & 2.

The author discusses in a general way the treatment of congenital club-

foot by splints, operation, etc., and by the bloodless reduction, and considers that the application of the latter in adult cases is altogether too limited.

He describes at length a case of club-foot in a man of fifty which he reduced. He lays especial emphasis on overcoming the first and the most of the resistance with the hand; and, when this fails, he has recourse to the Stille-Lorenz reduction instrument. He thinks that club-foot, even in advanced age, can be treated by reduction, and favors more the use of manual methods and the different reduction instruments than the operative methods. *David Townsend, Boston.*

245. Supinator Weakness in Flat Foot and its Treatment. By Hovorka. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

The importance of strengthening the supinator muscles in the treatment of flat foot is emphasized. The author holds this to be the only method of giving relief in some cases. After some preliminary considerations of an anatomical and physiological character regarding the movements of the foot, he describes his "supination board," which is composed of two smooth boards, joined at their long edges at an angle of 160–165 degrees, and covered with soft felt. The patients are made to walk to and fro upon this. This is at first very difficult, but is quickly learned.

In addition the author recommends the free standing exercises which are also in vogue in this country. Massage also is to him an important part of the treatment.—*A. H. Freiberg, Cincinnati.*

246. The Treatment of Club-foot. By Vulpius. *Arch. f. Orthopœdie*, Bd. I. Heft 3.

A general review of the subject presented to the International Congress in Madrid. Being a review, it is difficult to summarize the contents of the article.

Regarding the congenital form he concludes:—

The treatment should begin, if possible, no later than the second month, and should at this time consist of daily manual corrections, followed by flannel bandages. This is a preliminary to the "modelling correction," which is to be done in one or more sittings in the fourth month, and maintained by plaster. In older children this correction may be done at once, and, if difficult, in several sittings. Tenotomy of the tendo Achillis must be done almost invariably. The procedure cannot be said to be without danger. Fat embolism, fractures and bending of the leg bones, and decubitus may occur in spite of the greatest care. There are severe cases, even in the new-born, in which it is impossible to accomplish a satisfactory correction, or to succeed in retention, when this has been done. Having succeeded in correction and retention, the result is still sometimes marred by shortening of the foot, cavus, or planus, or other vestigiary deformity, some of which is not amenable to after-treatment.

A primary bloody operation on congenital club-foot is a mistake at any age. Manual or mechanical bloodless redressment should first be tried.

Concerning the treatment of paralytic talipes he considers separately the treatment of the deformity and the paralysis. In prophylaxis there are considered, in addition to the usual measures, tendon transplantation. This measure is discussed at some length. Tendon transplantation is to accomplish the maintenance of the foot in neutral position by the tension of the tendons, thereby preventing recurrence of deformity. In addition active movement is to be restored.

Arthrodesis is to be done only when there is no prospect of restoring active motion. He holds that it usually fails to produce perfect stiffening of the joint. In extensive paralysis he prefers to combine arthrodesis with tendon transplantation or shortening. Brace treatment is considered only as an adjuvant or substitute for the operative methods.—*A. H. Freiberg, Cincinnati.*

PARALYSIS.

247. Serratus Paralysis. By Richard Lightburn Sutton, M.D., Washington, D.C. *Jour. Am. Med. Ass'n*, vol. xli., Dec. 12, 1903, No. 24, p. 1473.

The author presents two cases of this rare type of peripheral palsy, the one in a woman, the other in a man. Both cases made complete or nearly complete recoveries, and the following comments on the cases are made:—

Cases of serratus paralysis, although well recognized, are of uncommon occurrence. Among 14,956 cases registered in the neurologic department of the Johns Hopkins Hospital there are but these two uncomplicated conditions of this character. In each the etiologic factor was a neuritis of the brachial plexus, affecting the nerve supply of the serratus secondarily. The primary cause in Case 2 was, in all probability, exposure, coupled with overexertion of the parts comprising the shoulder girdle. The practical points illustrated by these two cases are: 1. The relative infrequency with which the condition is encountered; 2. The intimate relationship its etiology bears to inflammation of the nerve trunks composing the brachial plexus; 3. The liability to unilateral involvement of the right side; 4. The favorableness of the prognosis in cases where trauma is not a factor in the causation; 5. The importance of early and continued treatment by galvanism.—*Robert B. Osgood, Boston.*

248. Congenital Intrauterine Poliomyelitis and Neuritis: The Question of their Occurrence and Influence upon So-called Congenital Deformities. By Joseph Fränkel, M.D., New York City, and B. Onuf, M.D., Sonyea, N.Y. *Am. Med.*, Jan. 16, 1904, p. 97.

Fränkel and Onuf detail the history of a case of congenital anterior poliomyelitis, a girl, aged four years, whose birth was normal and at full term, and who presented a negative family history. Immediately after birth there were noted double club-feet and inability to use the hands and feet naturally. At four years of age the child was well nourished and developed, but had "bilateral wrist-drop and drop-foot, face drawn to left side, and speech showed marked dysarthric features." There was also muscular atrophy of both arms and loss of power, dislocation of the right radius, but little loss of joint excursion, and absence of reflexes. The lower extremities showed asymmetry in length, loss of power, dislocation of left hip, disturbed gait, but normal reflexes. These conditions persisted until the child's death from diphtheria about two years later. A very careful and thorough autopsy and dissection was made by Dr. G. R. Elliott (who also reported the case), and the findings are tabulated in detail. A most exhaustive study of the nervous system is also recorded. The authors then proceed to discuss the anatomic findings with the view of determining the cause. The theories of intrauterine pressure or traumatism were eliminated by the muscular degeneration and paralysis, as was also that of arrest of development. The clinical history negatived the theory of primary muscular dystrophy of the atrophic type. The anatomic findings of hypertrophied connective tissue *between* the muscles instead of *within* them and the evidences of degeneration in the atrophied muscle rendered a diagnosis of polymyositis extremely improbable. The only remaining theories are those involving peripheral nerve changes or spinal lesions. The peripheral nerves were not examined, hence no opinion could be expressed as to that condition. In regard to the spinal lesions the conclusion is, "Weighing all the evidence, in conjunction with the clinical history, our conclusion is that in the case of congenital deformities reported by us the primary cause of the muscular changes, and incidentally also of the deformities, is either a poliomyelitis or a central neuritis of prenatal origin.

"Such conception would fully explain the muscular changes, and the skeletal deformities could again be easily accounted for, as induced by the muscular alterations. This has particular reference to the dislocation of

the hip, which can be best explained on the theory of changed dynamics of the hip joint. The adductors, which in our case were markedly changed, would under normal circumstances help to press the head of the femur outward and downward, and thus, with the other muscles acting as antagonists, keep the femur head in position. Loss of the adductor action, by taking away the resistance offered by these muscles, would then naturally give the other muscles full sway, and the head of the femur would be dislocated in the direction of the least muscular resistance; namely, upward and inward." *J. T. Rugh, Philadelphia.*

TENDONS.

249. **A Practical Method of Tendon Suture.** By Suter. *Archiv f. klin. Chir.*, Bd. LXXII. Heft 3.

The method which is chiefly designed for the repair of accidental wounds involves a lateral approximation of the divided ends. It will be best understood by examinations of the diagrams.

Two cases are reported in which it seems to have worked very well.—*A. H. Freiberg, Cincinnati.*

MISCELLANEOUS.

250. **The Heidelberg Coaptation Splint, a New Splint Contrivance.** (With illustrations.) By O. Vulpius. *Wien. med. Presse*, No. 50.

The splint consists of flexible longitudinal rods and different size cross clasps, which can be fastened to the longitudinal rod by a guiding slit. The cross clasps are first bent to follow the outline of the body. Both parts are made of aluminum. The splint may be bought at Bingler's in Ludingshaven. *David Townsend, Boston (journal review Deutsch. med. Woch., Jan.* 1, 1904).

251. **A New Frame for the Treatment of Fractures of the Lower Extremities.** By J. H. Cunningham, Jr., M.D., *Boston M. & S. Jour.*, Dec. 31, 1903.

Cunningham describes and illustrates very clearly a useful mechanical device for assisting in applying plaster-of-Paris casts to the lower extremity. It is simple, easily made, and would seem to be particularly useful in fractures with considerable displacement, compound fractures, or in cases where the operator cannot have the services of a skilful assistant.—*John L. Porter, Chicago.*

252. **A Case of Myositis Ossificans Progressiva.** By Michelson. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

A very carefully reported case, with instructive and well-reproduced radiograms.

There follows a description of the clinical history of these cases, in which the isolated ossifications after trauma and those occurring accidentally in the course of other diseases are excluded.

Although the clinical picture of the disease is characteristic and well defined, it is nevertheless difficult to draw sharply the line between this and the other ossifications occurring after trauma or even multiple exostosi formation. The bone formation always begins in the connective tissue, and is of the periosteal type. The formation of bone is very similar to the normal process. The various cell forms, cartilage cells, osteoblasts, bone corpuscles and trabeculæ, as well as hyaline cartilage, may be seen. Most authors are returning to Virchow's original conception of the disease, in which it is looked upon as a sort of tumor formation attributable to a con-

genital predisposition, to a local weakness or imperfection of the tissues. The final cause must probably be considered as a chemical irritant action of the blood, possibly a toxin effect.

Therapeutically there is absolutely nothing to offer these patients, except possibly the abstention from massage and other like measures, which are potent only for harm in these cases.—*A. H. Freiberg, Cincinnati.*

253. **Sulla Modalità di practicare la Vaccinazione Antitubercolare.** By E. Maragliano, Genoa. *Gazzetta degli Ospedali,* Milan, vol. xxv., No. 11.

Vaccination against Tuberculosis.—Maragliano has vaccinated a number of children against tuberculosis, the results constantly controlled by experiments on animals. The blood serum gradually acquired agglutinating power up to 1-100, the same as in the animals; and intravenous injection of the animals with virulent cultures of tubercle bacilli demonstrated that they were refractory, completely immune against tubercle infection. He thinks the probabilities are all in favor of the assumption that the children have been rendered similarly immune, although confirmation of the test by inoculation is, of course, out of the question. He proceeds as for small-pox vaccination; and there is a slight febrile reaction, as in the latter. By what he calls the "progressive" technic he commences with passive, and goes on to active immunization. He first injects immunizing substances plus substances derived from the bodies of killed bacilli, a material absolutely incapable of inducing infection. The third and final stage is the injection of products of the tubercle bacilli, also harmless. After a period of three to four months the serum has acquired antitoxic, antibacterial, and agglutinating properties. The controls treated step by step in the same way acquire these same properties, and prove completely immune to infection with virulent tubercle bacilli. The dead bodies of the bacilli are the chief factor in this vaccination, and the aim is to induce a focus of tubercular inflammation at the periphery entirely free from live tubercle bacilli. From this focus emanate the influences which induce the antitoxic, antibacterial, and agglutinating properties, the reaction of defence on the part of the organism. This insures a true and special vaccination. He makes the injection in the arm as for small-pox vaccination. A small amicrobian abscess develops, which is slow in healing, sometimes persisting for three or four months before completely healing. His experiences with animals have demonstrated beyond question, he believes, that it is possible to confer immunity by this simple technic. Maragliano adds that his research in this line preceded those of others by six years. Italy also took the lead in the administration of antitoxins by the mouth, as also in vaccinating man against tuberculosis. Elsewhere the question is still in the phase of mere hypothesis.—*Abst. Jour. Am. Med. Ass'n, April* 2, 1904.

254. **Study of Growth in Height.** By E. Forssberg. *Hygiea,* Stockholm, vol. lxv., No. 10.

Forssberg studies the length of the body in relation to age, sex, race, social standing, and other particulars.—*Abst. Jour. Am. Med. Ass'n, Feb.* 6, 1904.

255. **An Apparatus for Use in the Production of Successful Radiographs of the Lumbar Spine.**

Robert B. Osgood, of Boston, in a paper read before the Orthopedic Club of that city, describes an apparatus devised by him to aid in producing exact and useful radiographs of the lumbar spine. This device involves the principle of making the radiographic exposure under compression, brought forward by Albers-Schonberg. It consists of a conical tube of lead, with its great end, elliptical in shape, of a size to embrace the area extending from the ensiform to the pubes. Near its lesser end this tube is held within a simple wooden frame, to which are attached light steel arms extending out

over the sides of the table. Traction downward is brought to bear on these arms by means of webbing straps made fast to the table sides. This traction is exerted on the leaden cone in its turn, and presses it firmly downward upon the abdomen, already rendered lax by posture, to the limit of the patient's toleration. This pressure pushes away the mass of soft tissues lying in front of the spine, and at the same time acts as a concentrator to the rays. The small end of the cone is covered by a diaphragm screen to disperse the parasitic rays; and the exposure is made in the usual way, with the anode-stream focussed through the cone and the photographic plate under the patient. The author claims for the apparatus the cardinal qualifications of simplicity, cheapness, and portability, in contrast to the cumbersome devices heretofore described. The paper is illustrated by beautiful radiographs of the lumbar spine, normal and diseased, produced in this manner.—*Percy Brown, Boston.*

256. **An Easily Detachable Plaster of Paris Cast.** By Charles P. Bechtol, M.D. *Jour. Am. Med. Ass'n*, Sept. 5, 1903, xli. 606, No. 10.

The advantages of perfect fitting and easily removable splints in the treatment of fractures are pointed out.

His method consists in the application of an accurate plaster of Paris cast over Gigli saws, so arranged that the cast can be quickly cut into two pieces and the halves used as splints.—*R. B. Osgood, Boston.*

257. **A Postural Anomaly in Hysteria.** By Riedinger. *Muen. med. Woch.*, No. 14, 1902.

Case that of a man of forty years, presenting marked forward flexion of the trunk, a twist forward of the pelvis on its horizontal axis causing severe lordosis, together with flexion and inward rotation of both knees. Not being able to attribute the condition to any organic lesion, he classifies it with the traumatic neuroses, since it occurred after an injury. The motor impairment did not involve certain muscle groups, but lay rather in the disturbed execution of particular co-ordinated movements. Differentiates it from hysterical scoliosis by its bilateral character.—*Abst. Zeitschr. für orth. Chir.*, x. 13.

258. **Neoplasms of the Mucous Bursæ.** By Adrian. *Beitr. z. klin. Chir.*, Bd. XXXVIII. Heft 2.

Seventeen cases have been found in the literature, and two original ones are reported: one of the prepatellar and one of the subdeltoid. The differential diagnosis is difficult, especially from hygroma.—*Abst. Centr. für Chir.*, 1903, p. 978.

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[Elected May 14, 1903.]

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E. G. BRACKETT, M.D.

Secretary.

JOHN RIDLON, M.D.
92 State Street, Chicago.

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(Not yet appointed.)

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The President, the Treasurer, and the Secretary.

Temporary Publication Committee.

JOHN DANE, M.D. (*Chairman*). L. A. WEIGEL, M.D.

Member of Executive Committee, Congress of American Physicians and Surgeons.

W. R. TOWNSEND, M.D.
Alternate: R. W. LOVETT, M.D.

LIST OF PRESIDENTS.

1887. V. P. GIBNEY, M.D.
1888. NEWTON M. SHAFFER, M.D.
1889. E. H. BRADFORD, M.D.
1890. DE FOREST WILLARD, M.D.
1891. A. B. JUDSON, M.D.
1892. BENJAMIN LEE, M.D.
1893. A. J. STEELE, M.D.
1894. A. M. PHELPS, M.D.
1895. JOHN RIDLON, M.D.
1896. ROYAL WHITMAN, M.D.
1897. SAMUEL KETCH, M.D.
1898. R. W. LOVETT, M.D.
1899. W. R. TOWNSEND, M.D.
1900. H. M. SHERMAN, M.D.
1901. A. J. GILLETTE, M.D.
1902. H. AUGUSTUS WILSON, M.D.
1903. L. A. WEIGEL, M.D.

LIST OF MEMBERS.

1903. Baldwin, S. C., M.D. Orthopedic Surgeon to the Holy Cross Hospital, Salt Lake City, Utah; Surgeon to the S. L. & O. R.R.

1901. Bartow, Bernard, M.D. Clinical Professor Orthopedic Surgery, Medical Department, University of Buffalo; Orthopedic Surgeon, Children's Hospital; Orthopedic Surgeon, Erie County Hospital; Consulting Orthopedic Surgeon, Buffalo General Hospital. 481 Delaware Avenue, Buffalo, N.Y.

1892. Blanchard, Wallace, M.D. Attending Orthopedic Surgeon to the Home for Destitute Crippled Children. 34 E. Monroe Street, Chicago.

1889. Brackett, E. G., M.D. Assistant Surgeon to the Children's Hospital. 166 Newbury Street, Boston.

*1887. Bradford, E. H., M.D. Visiting Surgeon to the Children's and the Good Samaritan Hospitals; Professor of Orthopedic Surgery in Harvard Medical School. 133 Newbury Street, Boston.

1889. Burrell, Herbert L., M.D. Visiting Surgeon to the Boston City Hospital; Visiting Surgeon to the Children's Hospital; Professor of Clinical Surgery, Harvard University. 22 Newbury Street, Boston.

1891. Cook, Ansell G., M.D. Visiting Surgeon to the Hartford Hospital; Consulting Surgeon to Litchfield County Hospital. 340 Farmington Avenue, Hartford, Conn.

1893. Coolidge, Frederic S., M.D. Demonstrator of Surgical Appliances in Rush Medical College; Professor of Orthopedic Surgery, Chicago Post-graduate Medical College; Attending Orthopedic Surgeon to the St. Luke's and St. Elizabeth's Hospitals; Attending Physician to Children, Presbyterian Hospital. 103 State Street, Chicago.

1895. Dane, John, M.D. Junior Assistant Surgeon to the Children's Hospital; Assistant Surgeon to the West End Infant Hospital. 29 Marlborough Street, Boston.

1897. Davis, Gwilym G., M.D. Univ. of Penna. and Goettingen, M.R.C.S. Eng. Surgeon to the Philadelphia Orthopedic,

*Original Member.

Episcopal, and St. Joseph's Hospitals; Assistant Professor of Applied Anatomy, University of Pennsylvania. 255 South Sixteenth Street, Philadelphia.

1900. Elliott, George R., M.D. Orthopedic Surgeon to Montefiore Home for Chronic Invalids. 48 East Twenty-sixth Street, New York.

1902. Fitzhugh, P. Henry, M.D. Instructor in Orthopedic Surgery, New York Polyclinic; Chief of Clinic and Instructor in Orthopedic Surgery, Cornell Medical College; First Assistant Surgeon in New York State Hospital for Crippled and Deformed Children. 36 West Thirty-fifth Street, New York.

*1887. Foster, Charles C., M.D. Orthopedic Surgeon to the Cambridge Hospital; Visiting Physician to the Avon Home for Children; Visiting Physician to St. Luke's Home for Children. 8 Elmwood Avenue, Cambridge, Mass.

1901. Freiberg, Albert H., M.D. Professor of Orthopedic Surgery in the Laura Memorial Women's Medical College; Orthopedic Surgeon to the Cincinnati, Presbyterian, and Jewish Hospitals. 706 Walnut Street, Cincinnati, Ohio.

1899. Galloway, H. P. H., M.D. Surgeon to the Toronto Orthopedic Hospital; Orthopedic Surgeon to the Toronto Western Hospital; Orthopedic Surgeon to Grace General Hospital, Toronto. 12 East Bloor Street, Toronto, Canada.

*1887. Gibney, V. P., M.D. Clinical Professor of Orthopedic Surgery in the College of Physicians and Surgeons, Medical Department of Columbia University; Surgeon-in-chief to the New York Hospital for Ruptured and Crippled; Orthopedic Surgeon to the Nursery and Children's Hospital and to the Montefiore Home and Hospital, New York. 16 Park Avenue, New York.

*1889. Gillette, Arthur J., M.D. Professor of Orthopedic Surgery in the Minnesota State University; Orthopedic Surgeon to St. Luke's, St. Joseph's, Bethesda, City and County Hospitals, and the St. Paul Free Dispensary, and Consulting Orthopedic Surgeon to Asbury Hospital; Surgeon-in-charge of Minnesota State Hospital for Crippled and Deformed Children. 301 Pleasant Avenue, St. Paul, Minn.

1892. Goldthwait, Joel E., M.D. Orthopedic Surgeon to Carney Hospital; Consulting Orthopedic Surgeon to the Massachusetts General and the New England Hospitals. 372 Marlborough Street, Boston.

1892. Griffiths, J. D., M.D. Lieutenant Colonel and Medical Director First Brigade, National Guard of Missouri; President of the Association of Military Surgeons of the U.S.; Surgeon to

*Original Member.

St. Joseph's Hospital, Kansas City; Consulting Surgeon to the German Hospital, Kansas City; Consulting Surgeon to the Kansas City, Fort Scott, and Memphis R.R. South-west corner Ninth and Grand Avenue, Kansas City, Mo.

1898. Hoffmann, Phil., M.D. Clinical Lecturer on Orthopedic Surgery in the Medical Department, Washington University; Chief of the Orthopedic Clinic at St. John's Hospital. 705 North Channing Avenue, St. Louis, Mo.

1899. Hopkins, W. Barton, M.D. Visiting Surgeon to the Pennsylvania Hospital. 1904 South Rittenhouse Square, Philadelphia.

1893. Hosmer, A. B., M.D. Orthopedic Surgeon to St. Luke's Hospital. 103 State Street, Chicago.

*1887. Judson, A. B., M.D. Orthopedic Surgeon to the Outpatient Department of the New York Hospital. 1 Madison Avenue, New York.

*1887. Lovett, Robert W., M.D. Surgeon to the Infant's Hospital; Assistant Surgeon to the Children's Hospital; Surgeon to the Peabody Home for Crippled Children. 234 Marlborough Street, Boston.

1893. McCurdy, Stewart Le Roy, A.M., M.D. Orthopedic Surgeon to the Presbyterian Hospital and East End Dispensary; Professor of Anatomy and Oral Surgery, Pittsburg Dental College; Dean of Pittsburg School of Anatomy. 515 Pennsylvania Avenue, Pittsburg, Pa.

1889. McKenzie, B. E., B.A., M.D. Surgeon to the Toronto Orthopedic Hospital; Orthopedic Surgeon to the Grace General Hospital; Associate Professor of Clinical Surgery, Ontario Medical College for Women. 12 East Bloor Street, Toronto, Canada.

1901. McKim, Smith Hollins, M.D. House Surgeon to the Hospital for the Relief of Crippled and Deformed Children; Chief of Clinic to the Professor of Orthopedic Surgery, University of Maryland. 2000 N. Charles Street, Baltimore, Md.

1889. Myers, T. Halsted, M.D. Attending Orthopedic Surgeon to St. Luke's and New York Foundling Hospitals; Attending Surgeon to the New York Orthopedic Dispensary; Consulting Surgeon to St. John's Riverside Hospital, Home of the Annunciation, and New York Lying-in Hospital. 24 West Fiftieth Street, New York.

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*1887. Park, Roswell, M.D. Professor of Surgery in the Medical Department of the University of Buffalo; Surgeon to the Buffalo General Hospital; Consulting Surgeon to the Fitch Accident Hospital and the Buffalo Eye and Ear Infirmary. 510 Delaware Avenue, Buffalo, N.Y.

1900. Peckham, Frank E., M.D. Orthopedic Surgeon to the Rhode Island Hospital. 266 Benefit Street, Providence, R.I.

1901. Pegram, John C., Jr., M.D. Orthopedic Surgeon to St. Joseph's Hospital and to the Rhode Island Catholic Orphan Asylum; Orthopedic Surgeon to the Rhode Island Hospital; Consulting Surgeon to the Butler Hospital for the Insane; Demonstrator of Anatomy, Brown University. 277 Benefit Street, Providence, R.I.

1901. Porter, John L., M.D. Professor of Orthopedic Surgery, College of Physicians and Surgeons (Medical School of University of Illinois); Assistant Attending Orthopedic Surgeon, Home for Destitute Crippled Children; Attending Orthopedic Surgeon, St. Luke's Dispensary. 103 State Street, Chicago.

*1887. Ridlon, John, M.D. Professor of Orthopedic Surgery in the North-western University Medical School and North-western University Women's Medical School; Senior Attending Orthopedic Surgeon to St. Luke's Hospital and Michael Reese Hospital; Orthopedic Surgeon to the Wesley Hospital and the Evanston Hospital; Surgeon-in-charge of the Home for Destitute Crippled Children; Orthopedic Surgeon to the Chicago Hospital School; Consulting Orthopedic Surgeon to the Mary Thompson Hospital for Women and Children. 92 State Street, Chicago.

1903. Riely, Compton, M.D. House Surgeon at the Hospital for the Relief of Crippled and Deformed Children of Baltimore; Chief of Orthopedic Clinic to the University of Maryland; Radiographer to the Maryland University Hospital, 2000 North Charles Street, Baltimore, Md.

1903. Rugh, J. Torrance, M.D., A.B. Demonstrator of Orthopedic Surgery in the Jefferson Medical College; Assistant Orthopedic Surgeon to the Jefferson Medical College Hospital. 1616 Spruce Street, Philadelphia.

*1887. Sayre, Reginald H., M.D. Clinical Professor of Orthopedic Surgery in the University and Bellevue Hospital

Medical College; Orthopedic Surgeon to the Outdoor Department of the Bellevue Hospital; Consulting Surgeon to the Hackensack (N.J.) Hospital; Consulting Surgeon to the Hospital for Sick Children, Newark, N.J. 9 East Forty-fifth Street, New York.

*1887. Schapps, John C., M.D. Pony, Mont.

*1887. Shaffer, Newton M., M.D. Surgeon-in-chief to the New York State Hospital for the Care of Crippled and Deformed Children; Professor of Orthopedic Surgery, Cornell University Medical College; Consulting Orthopedic Surgeon to St. Luke's and Presbyterian Hospitals; Consulting Surgeon to the New York Infirmary for Women and Children. 28 East Thirty-eighth Street, New York.

1896. Shands, A. R., M.D. Professor of Orthopedic Surgery in the Medical Department of Columbia University; Assistant Physician-in-charge of General Diseases at Emergency Hospital and Central Dispensary; Surgeon-in-charge of Orthopedic Department Emergency Hospital and Central Dispensary; Attending Physician to Newsboys' Home and Children's Aid Society. 1319 New York Avenue, Washington, D.C.

1889. Sherman, Harry M., A.M., M.D. Orthopedic Surgeon to the Children's Hospital, San Francisco; Clinical Professor of Orthopedic Surgery in the Medical Department of the University of California. 1303 Van Ness Avenue, San Francisco.

1902. Spellissy, Joseph M., M.D. Out-patient Surgeon at the Pennsylvania Hospital; Assistant Surgeon at the Orthopedic Hospital and at the Orthopedic Department of the University Hospital; Visiting Surgeon at St. Joseph's and the MethodistHospitals. 110 South Eighteenth Street, Philadelphia.

1900. Starr, Clarence L., M.D. Orthopedic Surgeon to Hospital for Sick Children; Registrar to Toronto General Hospital; Demonstrator of Clinical Surgery in Medical Faculty, University of Toronto. 95 Bloor Street, West, Toronto, Canada.

*1887. Steele, A. J., M.D. Professor of Orthopedic Surgery in the Medical Department of Washington University; Orthopedic Surgeon to the Martha Parsons Children's Hospital and to the Missouri Baptist Sanitarium. 2825 Washington Avenue, St. Louis.

*1887. Taylor, Henry Ling, M.D. Professor of Orthopedic Surgery and Attending Surgeon to the New York Post-graduate School and Hospital; Assistant Surgeon to the Hospital for the Ruptured and Crippled; Consulting Orthopedic Surgeon to the State Epileptic Colony, Sonyea, N.Y. 125 West Fifty-eighth Street, New York.

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1892. Thorndike, Augustus, M.D. Surgeon to Good Samaritan Hospital; Assistant Surgeon to West End Infant Hospital and Junior Assistant Surgeon to Children's Hospital. 601 Beacon Street, Boston.

1889. Townsend, W. R., M.D. Professor of Orthopedic Surgery in the New York Polyclinic; Associate Surgeon to the Hospital for Ruptured and Crippled, New York; Visiting Surgeon to Randall's Island and Bayonne Hospitals; Consulting Orthopedic Surgeon to the French Hospital. 125 West Fifty-eighth Street, New York.

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1899. Wilson, C. W. 55 Union Avenue, Montreal.

1891. Wilson, H. Augustus, M.D. Clinical Professor of Orthopedic Surgery in the Jefferson Medical College; Professor of General and Orthopedic Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine; Consulting Orthopedic Surgeon to the Kensington Hospital for Women and to the Philadelphia Lying-in Charity. 1611 Spruce Street, Philadelphia.

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dren, and Alexandra Hospital for Hip Disease. 30 Bruton Street, W., London, England.

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1888. BERNARD ROTH, F.R.C.S. Eng., Orthopedic Surgeon to the Royal Alexandra Children's Hospital, Brighton. 38 Harley Street, Cavendish Square, W., London, England.

1903. W. SCHULTHESS, M.D., Privatdozent für Orthopädie; Chefarzt am Diakonissenhause, Neumünster. Neumünsterallee 3, Zürich V., Switzerland.

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1890. GEORGE ARTHUR WRIGHT, B.A., M.B., Oxon., F.R.C.S., Senior Assistant Surgeon, Royal Infirmary, Manchester; Surgeon to Children's Hospital, Pendlebury and Manchester. 8A St. John Street, Manchester, England.

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VOLUME I AUGUST, 1903 NUMBER 1

The American Journal *of* Orthopedic Surgery

THE OFFICIAL PUBLICATION OF THE AMERICAN ORTHOPEDIC ASSOCIATION

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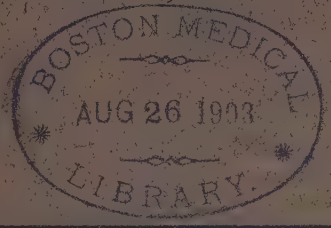

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VOLUME I NOVEMBER, 1903 NUMBER 2

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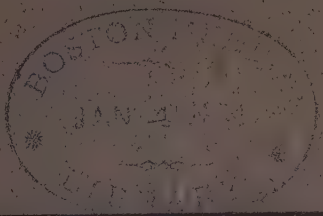

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